

**All you want to
know about the
BBC MICRO!**

THE MICRO USER

Volume 2
Number 1
March 1984
£1

**FREE
CONTEST!**

Win a package
of ROM based
firmware worth

£300

Mazemunch!

Full listing
of the classic
arcade game



Help us
celebrate
our first
birthday



— and test YOUR
skill at lighting
the candle



**32-page guide to using
discs on the BBC Micro**

Software for the BBC micro

Graphics ROM



The Graphic Extension ROM for the BBC Micro 32K

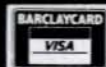
Our latest utility ROM includes over 28 new graphics related commands. These can be typed in like any normal commands and can of course, be included in BASIC programs. The commands are split into 3 distinct areas:-

1. **Sprite graphics**
These are multi-coloured shapes up to 24 x 24 pixels in size. Once a sprite has been designed (using in-built routine) it can be plotted at any position on the screen and easily moved around. A sprite can also be part of a 'film' — a sequence of frames allowing animation. Up to 32 sprites or 'films' can be active on the screen at any time. A 'film' can contain up to 47 frames, each frame being any sprite image.
2. **LOGO 'turtle' graphics**
By using simple FORWARD, BACKWARD, LEFT and RIGHT commands a 'turtle' can be moved very quickly around the screen, producing intricate patterns by the most user-friendly means. Including these commands in structured BBC BASIC programs provides a system faster and more powerful than many of the packages currently used to demonstrate the LOGO language.
3. The third section consists of a large number of general purpose commands, such as:-
★FILL which will fill ANY area on screen.
Fast circle and arc drawing
3D graphics routines allowing X, Y, Z co-ordinate plotting
Large character printing in a range of patterns
Scaling — allowing any part of the screen to be expanded or diminished
A rotate command that will rotate all plotting by any angle around the origin
Because this is a ROM, all the commands are instantly available, and has a built-in help menu showing the syntax of all commands. Supplied with a comprehensive manual and step-by-step fitting instructions, suitable even for the inexperienced. This ROM represents extremely good value for money.

Available directly from us, mail order only, or from all good dealers
£28.00 plus £1.00 p&p plus VAT

**COMPUTER
CONCEPTS**

CASH OR ROYALTIES. We specialise in quality software for the BBC machine and can offer the best rates around. We are always interested in obtaining new programs to add to our range and offer either a cash payment for the outright purchase or alternatively pay a royalty on each one sold.

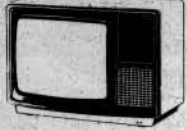


16 Wayside, Chipperfield, Herts WD4 9JJ. Telephone (09277) 69727

Computerama

GRUNDIG 14" TV/MONITOR + REMOTE CONTROL

RGB input for a super clear display. The picture must be seen to be believed. We have not seen better colour on any dedicated monitor.



ORDER TODAY, we guarantee that you will not be disappointed. And remember, when you finish computing, just flick the switch and you have a super quality 14" colour TV - what better way to justify the expense to your wife or girlfriend!

Complete with lead for BBC for only
£309 inc VAT

Turn your BBC into a powerful business system with the **NEW Torch Z80 2nd Processor Board** includes additional **64K RAM PLUS Free Software** valued at over **£1,100**.
- ONLY **£429 inc. VAT**.

Software includes:

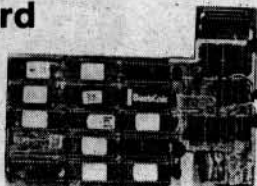
- * Perfect Writer
- * Perfect Speller
- * Perfect Calc
- * Perfect Filer
- * Torch Net
- * Commanex Business Games

ORDER NOW. And receive our Enhanced Utilities Disc. Many additional and useful programs included.

HURRY - limited numbers available.

AT PL SIDEWISE Rom Expansion Board

- * Full sideways Rom Expansion to 16 Roms
- * 16K Battery backed CMOS Ram option
- * No soldering required to fit sideways
- * Plug-in-and-go construction - Mounts neatly inside the BBC machine.
- * Full buffering of address and data buses - prevents data bus loading problems associated with unbuffered boards.
- * Pin1 of on board sockets are connected properly - No spurious crashes due to this known fault on BBC
- * Existing sockets on BBC are usable. All eprom sockets are accessible without removing sideways.



ONLY £43.70
+ £1.00 carriage

TORCH Z80 DISC PACK with over £1,100 of software FREE



NOW ONLY £835 inc. vat
Free carriage UK only

Software includes:
* PERFECT WRITER * PERFECT SPELLER * PERFECT CALC
* PERFECT FILER * TORCH NET * Comanex - The Interactive Management Game. Approved and used by leading management consultants. The TORCH Z80 DISC PACK is the most powerful BBC Disc upgrade available, it provides 800K of storage plus a Z80 Second Processor running Torches own CP/M compatible operating system - over 200 packages now available - discs can also be used for storage under Acorn D.F.S. system.

Clip this ad to your order to receive free 40/80 T converter program.

BBC	INC VAT
Acorn Electron	199.00
BBC Model B	399.00
BBC Model B + DCS	489.00
BBC Disc Upgrade	87.00
BBC A-B Full Upgrade	95.00
BBC Teletext Receiver	225.00
BBC Z80 2nd Processor	T.B.A.
BBC 8502 2nd Processor	T.B.A.
DISC DRIVES	INC VAT
LVL Single x 100K Drive	285.00
LVL Expansion Drive	149.00
LVL Dual x 100K Drive	389.00
Pace Single 100K	212.25
Pace Single 40/80T D/Sided	349.95
Pace Dual 100K	379.95
Pace Dual 40/80T D/Sided	684.95
Pace 200K 40T D/Sided	270.00
Torch Dual 400K Z80 Disc Pack	835.00
Opus Single 100K	179.95

ORDER A COMPLETE SYSTEM - GET ALL LEADS FREE

MONITORS	INC VAT
Microvitec 14" Colour	247.00
Sanyo 14" Colour	287.00
Fidelity 14" Colour Monitor	229.00
Grundig 14" Colour TV/Monitor	289.00
Sanyo 12" Green Screen	89.00
Phoenix 12" Hi-Res Amber	129.00
PRINTERS	INC VAT
Epson RX80	269.00
Epson RX80 FT *NEW	299.00
Epson FX80	425.00
Epson FX100 *NEW	569.00
Star Gemini 10X	249.95
Shinwa CP80	229.00
Juki 6100 Daisywheel	449.00
MISCELLANEOUS	INC VAT
Sanyo DR101 Data Recorder	39.95
Cassette Leads - all types	3.90
Acorn Joysticks	13.00
Quickshot Joystick	19.95
Printer Cable (parallel) 1.2 m	13.00
BBC Deluxe Dustcover	5.95
Light Pen	28.95
The Plug Power Filter	14.95
ATPL Rom Expansion Board	43.70

ROM SOFTWARE	
Wordwise	39.00
View	59.00
Disc Doctor	32.95
Termi (terminal emulator)	32.95
Graphics Rom	32.00
Pace DFS	39.95
HCCS Forth	
HCCS Logo Forth	
HCCS Pascal	57.00
HCCS Excel	
LVL LDOS Double Density	89.00
DFS Enhancer	18.50
BOOKS	NO VAT
30 Hour Basic	5.95
ALP for BBC Micro	8.95
BBC Micro Disc Companion	7.95
Advanced Programming Techniques	7.95
Basic Programming on the BBC Micro	5.95
Creative Graphics	7.50
Graphs & Charts	7.50
Lisp Manual	7.50
Forth Manual	7.50
BCPL Manual	15.00
30 Programmes for BBC	4.95
100 Programmes for the BBC Micro	8.95
Discovering BBC Machine code	8.95
21 Games for the BBC	5.95
The Book of Listings	3.75
The BBC Micro An Expert Guide	6.95
The Computer Book	6.75
Programming the BBC Micro	5.95
Using Floppy Discs with the BBC Micro	9.95
Creating Adventure Games on the BBC	8.95
Games BBC Computers Play	8.95

WE ACCEPT INSTITUTIONAL AND EDUCATIONAL ORDERS

ALLIGATA	INC VAT
Contract Bridge	7.95
Bug Bleser	7.95
Dam Busters	7.95
Eagle Empire	7.95
Neanderthal Man	7.95
Primary Art	7.95

PROGRAM POWER	INC VAT
Killer Gorilla	7.95
Cheese B	7.95
Cybertron Mission	7.95
Croaker	7.95
Danger UXB	7.95
Escape Moonbase Alpha	7.95
Felix in the Factory	7.95
Felix & the Fruit Monsters	7.95
Hell Driver	7.95
Swoop	7.95
Chemistry	6.85
Positron	7.95
Physics	6.85
Demon Decorator	6.85
Alien Swirl	7.95
Alien Destroyers	7.95
Martian Attack	7.95
Moon Raider	7.95
Labyrinths of LaCasse	7.95
Zarrah	7.95

SUPERIOR SOFTWARE	INC VAT
Colditz Adventure	7.95
Galactica	7.95
Road Runner	7.95
Hunchback	7.95
Pontoon	7.95
2002	7.95
Gideons Gamble	7.95
Lunar Mission	7.95
Lost City	7.95
DYNA-BYTE	INC VAT
Pool	7.95
COMPUTER CONCEPTS	INC VAT
Logo-2	11.50
OPUS	INC VAT
Dogfight	9.95
BUG-BYTE	INC VAT
Sea Lord	7.50
Twin Kingdom Valley	7.95

RING FOR LATEST PRICES, MANY REDUCTIONS EXPECTED

BBC/ACORNSOFT (A Selection)	INC VAT
Algebraic Manipulation	9.95
Arcadians	9.95
Business Games	9.95
Castle of Riddles	9.95
Creative Graphics	9.95
Countdown to Doom	9.95
Forth	16.85
Graphs and Charts	9.95
Hopper	9.95
Lisp	16.85
BCPL (Rom + Disc)	99.95
Missile Base	9.95
Meteors	9.95
Monsters	9.95
Peeke Computer	9.95
Planetoid	9.95
Rocket Raid	9.95
Snooper	9.95
View	59.00
Sphinx Adventure	9.95
Starship Command	9.95
Tree of Knowledge	9.95
Snapper	9.95
Speech Kit	55.00
Personal Money Management	9.95
Draughts and Reversi	9.95
Wordhunt	9.95
White Knight II	11.50
Vutype	15.00
Tax Calc	20.00
Beyond Basic	10.00
Toolbox	10.00
Canyon	10.00
Record Keeper	15.00
Doctor Who	10.00
SOFTWARE INVASION	INC VAT
30 Bomb Alley	7.95
Gunsake	7.95
Attack on Alpha Centauri	7.95
Vortex	7.95
VISION	INC VAT
Snooper	7.95
Daredevil Dennis	7.95
PSION	INC VAT
Saloon Sally	7.95
VuCalc	14.95
VuFile	14.95
MELBOURNE HOUSE	INC VAT
The Hobbit	14.95

A SMALL SELECTION FROM OUR VAST RANGE

CLARES	INC VAT
Graphkey	7.95
Replica (Disc Only)	9.95
Graph Disc	12.95
The Key (Disc Only)	12.95
Single Key Entry	4.95
Shadow/Inspector	7.95
State 40/80T for Discs	
DR SOFT	INC VAT
747 Flight Simulator II	8.95
AMCOM	INC VAT
Space Highway	6.95
GEMINI GAMES	INC VAT
Missile Control	9.95
Liberator	9.95
Caterpillar	9.95
GEMINI	INC VAT
Cash Book Acc	95.00
Inv & Statements	19.95
Commercial Acc	19.95
Mailing List	19.95
Data Base	19.95
Stock Control	19.95
Home Accounts	19.95
SOFTWARE FOR ALL	INC VAT
Stock Control C/D	19.95/29.95
Invoicing/Statements C/D	19.95/29.95
Sales/Purchases C/D	19.95/29.95

SAME DAY DESPATCH ON STOCK ITEMS

ADVENTURE INTERNATIONAL	INC VAT
Adventureland	9.95
Voodoo Castle	9.95
Secret Mission	9.95
Pirate Adventure	9.95
SOFTSPOT	INC VAT
Transistors Revenge	6.95
Heist	6.95
AARDVARK	INC VAT
Zelaga	6.90
WATFORD	INC VAT
Pengo	8.90
A&F	INC VAT
Cylon Attack	7.90
Chuckie Egg	7.90

MAIL ORDER
Put your order today to
COMPUTERAMA, 1 Sash Street, Stafford
ST16 2PS Or telephone your Access or
Barclaycard number, we will despatch
immediately (0785) 41899

Call in today. Home Computer Centre for the
BBC enthusiasts.
Send large SAE for further details of any
product.



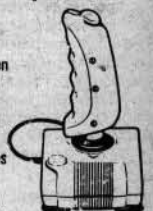
CARRIAGE
Micro's Monitors, Disc-Drives,
Printers £8.00, Books £1 each.
Cassette Decks £2.00, Leads and software
50p/item, £1.50 max.

WE EXPORT WORLDWIDE
Telex 36540 Hours G

QUICKSHOT II BBC JOYSTICK

- Now with rapid
fire option

Self centring
joystick. Works even
with keyboard only
programs.
A sensation at the
Micro User Show.
More fun - reaches
the games other
joysticks cannot.
Limited supplies of
this item.



£19.95 + £1.00 p&p

Computerama

STAFFORD

59 Foregate Street, Stafford,
ST16 2PR. Tel: (0785) 41899

STOKE-ON-TRENT

11 Market Square Arcade,
Hanley, Stoke-on-Trent,
ST1 1PD.
Tel: (0782) 268620

SHREWSBURY

13 Castle Gates, Shrewsbury
SY1 2AB. Tel: (0743) 60528

CONTENTS



Vol. 2 No. 1 March 1984

Managing Editor
Derek Meakin

Features Editor
Mike Bibby

Technical Editor
Mike Cook

Production Editor
Peter Glover

Layout Design
Heather Sheldrick

Advertisement Manager
John Riding

Advertising Sales
Mike Hayes

Marketing Manager
Sue Casewell

Editor-in-Chief of
Database Publications:
Peter F. Brameld

Tel: 061-456 8383 (Editorial)
061-456 8500 (Advertising)

Telex: 667664 SHARETG
Prestel: 614568383

Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:

£14.50 - UK
£15 - Eire (IR £18)
£20 - Rest of world
(surface)
£65 - Rest of world
(airmail)

ABC Member of Audit
Bureau of Circulations

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

© 1984 Database Publications Ltd. No material may be reproduced in whole or in part without written permission. While every care is taken, the publishers cannot be held legally responsible for any errors in articles or listings.

The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

Distribution to the news trade in the UK and Ireland is by Wells Gardner, Darton and Co Ltd., Faygate, Horsham, West Sussex RH12 4SU (tel: Faygate 444). Enquiries regarding overseas distribution should be made direct to the publishers.

NEWS

Keep in touch with the latest happenings in the eventful world of the BBC Micro.

33

BEGINNERS

Bring your micro to life with a touch of colour. We show you how simply it can be done.

40

ONLY HUMAN

The second part of our series on user-friendly programs, with the emphasis on education.

47

NETWORK

An economic and simple method of allowing several BBC Micros to share a disc unit.

52

COMPETITION

List eight ROMs in order of importance, and win them - plus a sideways ROM board.

55

DENARY DERRICK

Lots of fun and educational value in this simple number game for children.

57

WORKSHOP

Passing arrays to procedures is simplicity itself if you use our cunning techniques.

59

MAZEMUNCH

Tremendous fun for all in our explosive version of one of the great, all-time arcade hits.

64

SOUND ADVICE

We continue our series by explaining how to fully exploit the sound effects channel.

69

BIRTHDAY

Our anniversary game. Can you light the candle before you are blown out?

73

76**ADVENTURES**

Our forthright columnist takes her usual critical look at the world of adventures.

113**RECOVERY**

'Bad Program' messages? Why not use our invaluable program recovery routine?

116**SOFTWARE SCENE**

Our team of frank and thorough reviewers assess some of the latest software releases.

122**BODY BUILDING**

A high speed A/D converter can turn your BBC Micro into an oscilloscope.

133**HARDWARE REVIEW**

Our impartial experts give their assessment of new pieces of hardware for the BBC Micro.

141**LIGHT PEN**

Single pixel resolution for light pens is now possible with our resolution revolution!

153**TAPE & DISC OFFER**

Save yourself the chore of keying in programs with this month's cassette or disc.

154**BACK ISSUES**

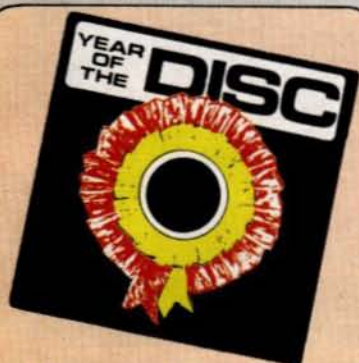
Make sure your Micro User collection is complete. All you've missed and how to get it.

168**SUBSCRIBE NOW**

A year's subscription to The Micro User will bring you a FREE Micro User cassette.

175**MICROMAIL**

The page you write yourself. Just a small selection from the flood of letters pouring in.

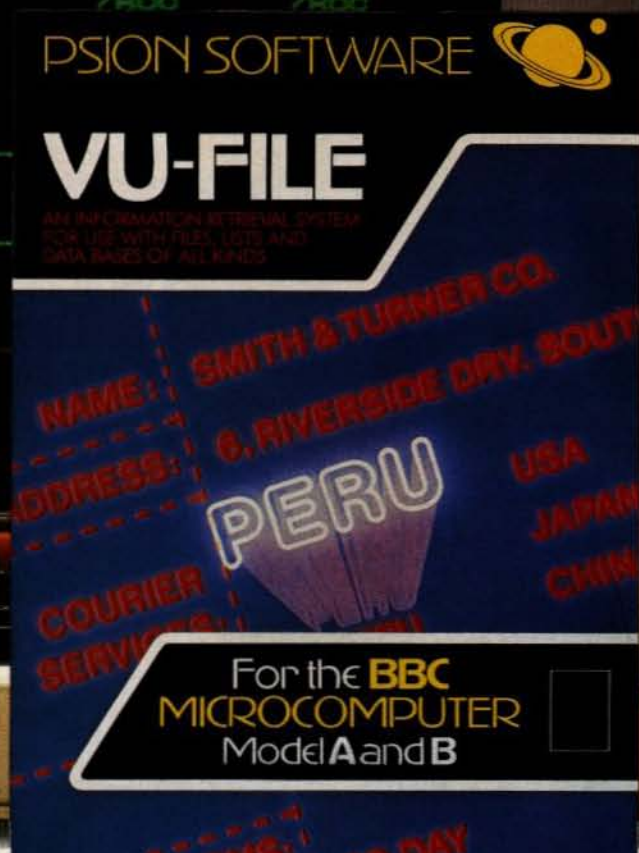


Don't miss our 32 page disc special – essential reading for anyone interested in discs. We explain:

- 82 Discs for beginners
- 85 Verifying your programs
- 88 Using the DFS commands
- 99 Saving screens on disc
- 104 How discs work
- 109 Loading via a menu

PLUS an in depth survey of disc drives available for the BBC Micro – see the centre pages.

ESTIMATED SALES	42000	42840
LESS COST of sales	28560	29131
GROSS PROFIT	13440	13709
LESS		
WAGES	7800	7800



Mind your own Business

Vu-Calc and Vu-File are two of our most powerful and popular Software packages that make practical and serious use of your BBC Microcomputer.

Whether you use them to help run your business or keep your household records and plans in order, Vu-Calc and Vu-File form essential Software that no serious BBC Micro user should be without.

Supplied on cassette they can be used with cassette or disk systems, and come with detailed user manuals.

Vu-Calc and Vu-File are written in Machine code, and feature full on-screen prompting with Printers driven through either serial or parallel ports.

Vu-Calc and Vu-File require 32K RAM, and will operate with MOS 0.1, MOS 1.0, MOS 1.2 and BASIC 1 OR BASIC 2.

Vu-Calc—The Versatile Spreadsheet Programme

Vu-Calc is a sophisticated and powerful 'spreadsheet' programme that generates and calculates large tables of interdependent text, data and formulae.

Vu-Calc's grid has 52 rows x 28 columns available to the user and tables and reports can be printed, or stored on cassette or disk.

Vu-Calc's applications include:—
Cashflow Projections
Home Finance Management
Engineering and Statistical Tables
Investment Forecasting
Business Planning
Profit and Loss Statements
Break Even Analysis

£14.95

Vu-File—The Complete Filing System

Vu-File is a powerful Data Base Management system for sophisticated electronic filing and manipulation of information of all kinds.

Vu-File creates dedicated Data Bases to suit your requirements with a capacity for nearly 16,000 characters. Full on-screen prompting ensures ease of use.

Vu-File's applications include:
Catalogues of Stamps, Coins, Books, Records Etc...
Names and Addresses
Customer Accounts
Estate Agents Lists
Medical Records
Club Memberships
Records and Lists of all Kinds

£14.95



The whole range of quality Psion Software, including the popular Vu-Calc and Vu-File applications programmes are available from W. H. Smith, Boots and all good software dealers.

Dealers are invited to contact Psion to find out details of substantial discounts for trade orders of our best selling software for the BBC Microcomputer.

p
h

p&h electronics Ltd

5 THE PARADE, YATELEY
NEAR CAMBERLEY, SURREY

TEL: YATELEY 877222

BBC 'B'
IMMEDIATE
DELIVERY
BBC 'A'

BBC MICRO CENTRE

BBC

BBC Model A	£299.00
BBC Model B	£399.00
BBC Model B + Disc/Int	£469.00
BBC Disc Interface	£95.00
Speech Interface	£54.00
BBC Teletext Receiver	£220.00
View Word Processor	£59.00

BBC DISC DRIVES

Acorn/LVL single 100K drive (expands to double)	£240.00
Acorn/LVL dual 100K drive	£370.00
Pace single 100K drive	£210.00
Pace 200K drive	£250.00
Pace dual 100K drive	£370.00
Pace 40/80 switchable	£365.00
Pace dual 40/80 track switchable	
double sided drive 800K	£670.00
Cumana 100K slim	£210.00
Cumana dual 100k slim	£375.00
Cumana Dual 200K slim	£485.00
LVL DD Disc Int Kit	£90.00
Pace Disc Int Kit	£95.00

ACCESSORIES

Cassette Recorder	£24.00
Cassette with Counter + Din	£29.00
Joysticks SW Self-Cen PR	£17.50
Joysticks Analogue PR	£17.50
Micro Dust Cover	£5.00
R.H. ELE Light Pen	£44.00
TV Aerial/Computer Switch	£2.50
Plinth for Monitor	£18.50

GEMINI Business/Games

Cash Book Acc.	£95.00
Beeb Calc	£19.95
Inv. & Statements	£19.95
Commercial Acc.	£19.95
Mailing List	£19.95
Database	£19.95
Stock Control	£19.95
Home Accounts	£19.95
Word Processor	£19.95
Liberator	£9.95
Missile Control	£9.95
Add £5 for disc versions	

BOOKS FOR YOUR BBC MICRO

Let your BBC Micro Teach you to Program	£6.45
Assembly Language Programming for BBC	£8.95
Advanced 6502 Programming	£10.25
The Book of Listings (BBC Publications)	£3.75
The Computer Book (BBC Publications)	£6.75
Creative Graphics (Acornsoft)	£7.50
Graphs and Charts (Acornsoft)	£7.50
Forth Manual (Acornsoft)	£7.50
Lisp Manual (Acornsoft)	£7.50
Programming the 6502	£9.95
6502 Software Design	£10.25
Easy Programming for BBC Micro	£5.95
35 Educational Programs for BBC Micro	£6.95
Further Programming for BBC Micro	£5.95
Programming for BBC Micro	£6.50
Basic Programming on the BBC Micro	£5.95
21 Games for the BBC Micro	£5.95
30 Hour BASIC	£5.95
BBC Micro Revealed	£7.95
6502 Sub Routines	£10.50
Assy Lang Programming for BBC	£11.95
Discovering BBC Machine Code	£6.95
Sound and Graphics	£7.95

ACORNSOFT

Business Games	£9.95
Tree of Knowledge	*E £9.95
Peeko - Computer/Manual	£9.95
Algebraic Manipulation	£9.95
Creative Graphics Cassette	*E £9.95
Graphs and Charts Cassette	*E £9.95
Desk Diary/Manual	£9.95
Lisp Cassette	*E £16.85
Forth Cassette	*E £16.85
Philosophers Quest	£9.95
Sphinx Adventure	£9.95
Castle of Riddles	£9.95
Monsters	*E £9.95
Snapper	*E £9.95
Planefold	£9.95
Arcade Action	£11.90
Rocket Raid	£9.95
Meteors	*E £9.95
Arcadians	*E £9.95
Sliding Block Puzzles	£9.95
Cube Master	£9.95
Super Invaders	£9.95
Missile Base	£9.95
Starship Command	*E £9.95
Countdown/Doom	£9.95
Snooker	£9.95
Word Sequencing	£9.95
Word Hunt	£9.95
Missing Signs	£9.95
Draughts & Reversi	*E £9.95
JCB Digger	£9.95
Hopper	*E £9.95
Chess	*E £9.99

SOFTWARE INVASION

3D Bomb Alley	£7.95
Vortex	£7.95
Guns Smoke	£7.95
Attack on Alpha Centauri	£7.95

BBC SOFTWARE

White Knight - Chess	£11.50
Dr Who	£9.99
Tool Box	£21.00
Beyond Basic	£11.50
Home Finance	£9.99
Record Keeper	£9.99

SOFTWARE FOR YOUR BBC MICRO

MICROPOWER

Moon Base Alpha	*E £7.95
Moon Raider	*E £7.95
Nemesis	£7.95
Timetrek	£7.95
Galactic Commander	£7.95
Asteroid Storm	£7.95
Swoop	*E £7.95
Alien Swirl	£6.95
Laser Command	£7.95
Space Jailer	£6.95
Martian Attack	£7.95
Positron	*E £6.95
Zarm	£7.95
Intergalactic Trader	8.95
Cosmic Combat	£6.95
Cybertron Mission	*E £7.95
Bumble Bee	£7.95
Caveman Adventure	£6.95
Felix + The Fruit Monsters	*E £7.95
Bandits at 3 o'clock	*E £6.95
Labyrinths of Lacoshe	£7.95
Croaker	*E £7.95
Danger UXB	£7.95
Cowboy Shootout	£6.95
Chess	*E £7.95
Killer Gorilla	*E £7.95
Hell Driver	£7.95
Demon Decorator	£6.95
Draughts	£6.95
Felix in the Factory	*E £7.95
Chemistry	£6.95
Constellation	£6.95
Physics	£6.95
World Geography	£6.95
Where	£6.95
Draw	£9.95

BUG BYTE

Old Father Time	£9.50
Graphics Pack	£9.50
Sea Lord	£7.50
Oblivion	£7.50
Galaxy Wars	*E £7.50
City Defence	*E £7.50
Space Pirates	£5.50
Twin Kingdom Valley	*E £9.50
Space Invaders	£5.50
Music Synthesiser	£9.50

SUPERIOR

Galaxians	£7.95
Centipeds	£7.95
Invaders	£7.95
Space Fighter	£7.95
Alien Dropout	£7.95
Fruit Machine	£7.95
Frogger	£7.95
Road Runner	£7.95
Wordwise word processor - ROM	£40.00
Logo - ROM	£29.00
Disc Doctor - ROM	£29.00

PRINTERS

Epson RX 80T	£280.00
Epson RX 80FT	£315.00
Epson FX 80	£420.00
Star Gemini 10X	£250.00
Star Delta	£399.00
Star DP515 136 col.	£270.00
Silver Reed Ex43	£399.00
Juki 6100 Daisy Wheel	£399.00

MONITORS CTV

Microtec 14" colour	£240.00
Sanyo 14" colour	£240.00
Sanyo 12" green	£90.00
Philips 14" colour TV	£190.00
Ferguson 14" colour TV	£165.00

**SUPPLIES
TO EDUCATION
AUTHORITIES FULL
SERVICE SUPPORT
WITH SYSTEM
UPGRADE**

**ACORN
ELECTRON
£199.00**

*E For ELECTRON
PLEASE STATE

FAST MAIL SERVICE—SAME DAY DESPATCH ON ITEMS IN STOCK

MAIL ORDER COUPON

Please send me:

1	4
2	5
3	6

I enclose cheque /P.O. for

Or please debit my Access/Barclaycard/Visa* (delete as applicable)

Card Number

Expiry date

Name

Address

Telephone

P&H ELECTRONICS LIMITED

Unit 3 · Hogwood Lane · Finchampstead · Berkshire RG11 4QW

CARRIAGE COSTS - Micro's, Monitors, Disc Drives, Printers £7

Books, Cassette Decks, Leads, Software 50p each item.

ACCESS, BARCLAYCARD VISA ORDERS WELCOME

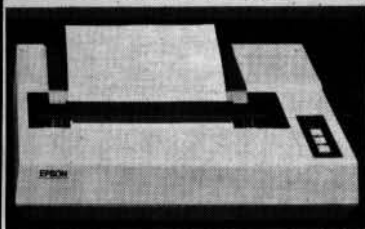
CREDIT FACILITIES

Instant credit up to £1,000. Deposit 10%.

B3



PRINTERS:



We have selected a range of printers that will meet most requirements.

SEIKOSHA—ranging from a low-cost utility printer, right up to an advanced four-colour printer.

EPSON—the high quality dot-matrix printers that set the standard in the industry—versatile printers that provide the optimum in performance

& reliability. The RX80/FT provides all standard printing & graphic functions, (single sheets & perforated paper), with the de-luxe FX80 giving in addition proportional printing, italics, programmable characters etc. The FX100 also allows the use of 15" wide paper. The **JUKI** daisywheel provides a quality normally found in printers costing far more. Printer cables, interfaces, ribbons, paper etc. are all normally available from stock.

SPECIAL OFFER
Epson FX80
only £325

DISC DRIVES:

A full range of disc drives fitted with quality Japanese slimline mechanisms, (such as TEAC, MITSUBISHI etc.) are supplied ready to connect to your BBC, and come complete with necessary cables, formatting disc, manual etc. TEAC & MITSUBISHI mechanisms can operate in single and double density modes. The switchable disc drives give the user flexibility, by allowing access to both 40 & 80 Track discs. The 40/80 Track switching module can be simply attached to your standard 80 track drives thereby vastly increasing their versatility. For the serious user whose prime need is data storage, we can offer the **KENDA PROFESSIONAL DMFS**, which provides a genuine double density system. We also have a full range of diskettes, variety of disc storage cases, disc-drive cables. The **Floppicle** head cleaning kit, is the ideal way to ensure optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion, and ensure continuous data capture and transmission.



TORCH Z-80 Pack:

Your BBC computer can be converted into a business machine at a cost slightly higher than a 800K disc drive. The Torch pack with twin disc drive and a Z80A processor card greatly enhances the data storing and processing capability of the computer (NOTE: In BBC mode the disc pack functions as a normal BBC drive). Z80A card comes with 64K of RAM and a CP/M compatible operating system in ROM. The system is supplied complete with a BBC owner's user guide, a System/Demo disc, a PERFECT software package and COMANEX, a business management game. The PERFECT software package comprises of a DATABASE, CALC, WORD PROCESSOR and SPELLER commercially valued at over £1000. We are now supplying a Utility that enables software on 40 Track discs to be transferred to 80 Track discs **£730**.

NOW AVAILABLE—The TORCH Z80 SECOND PROCESSOR CARD—for those who already have suitable disc drives. The card is supplied with all the free software, as detailed above, presenting a very attractive package. **£375**.

ACORN COMPUTER SYSTEMS

BBC Model B	£348.00a
BBC Model B+Econet	£389.00a
BBC Model B+DFS	£409.00a
BBC Model B+DFS+Econet	£450.00a
Acorn Electron	£175.00a
BBC Teletext Receiver	£195.00a
BBC Dust Cover	£4.00d
Pair of Joysticks	£117.00c

TORCH Z80 SYSTEM

TORCH Z80 Disk Pack	£730.00a
TORCH Z80 2nd Processor Card	£375.00a

UPGRADE KITS

A to B Upgrade Kit	£75.00d
Installation	£15.00d
DFS Kit	£84.00d
Installation	£15.00d
Econet Kit	£45.00d
Installation	£25.00d
Speech Kit	£47.00d
Installation	£10.00d

ECONET ACCESSORIES

Printer Server Rom	£41.00c
File Server Level 1	£86.00c
File Server Level 2	£216.00b
Clock + 2 Terminators	£85.00b
Econet User Guide	£10.00d

BBC FIRMWARE

1.2 Operating System	£7.50d
Basic II Rom	£32.00d
View Word Processor Rom	£52.00c
Wordwise W/P Rom	£32.00c
Beebpen W/P Rom	£29.00c
BCPL ROM+Disc	£87.00b
Pascal-T ROM	£44.00c
Disc Doctor Utility Rom	£30.00c
Termi Emulator Rom	£29.00c
Beebcalc Spreadsheet Rom	£32.00c
ULTRACALC Rom (BBC Publ.)	£65.00c
Gremlin debug Rom	£28.00c
Computer Concepts Graphics Rom	£28.00c

BBC ANCILLARY HARDWARE

EPROM Programmer	£79.50b
Smartmouth Speech Synthesiser	£37.00b
RH Light Pen	£39.50b
"Time-Warp" Real-Time	
Clock/Calendar	£29.00b
ACORN IEEE Interface ANK01	£282.00c
EXMON	£20.00d
TOOL KIT	£20.00d

PRINTERS & PLOTTERS

EPSON FX-80	£325.00a
EPSON RX-80 FT	£250.00a
EPSON FX-100	£490.00a
NEC PC80 23BE-N	£310.00a
SEIKOSHA GP100A	£170.00a
SEIKOSHA GP250X	£199.00a
SEIKOSHA GP700A Colour	£375.00a
JUKI 6100 Daisy wheel	£350.00a
MCP40 Col. Printer/Plotter	£129.00a

Accessories:

Parallel Printer Lead	£10.00d
Serial Printer Lead	£8.00d
Epson Serial Interface 2K	£60.00c
Epson Serial Interface	£50.00c
NEC Serial Interface	£42.00c
Epson Paper Roll Holder	£17.00c
FX-80 Tractor Attachment	£37.00c
PAPER Fanfold 2000 sheets	£13.50b
Printer Sharer Parallel	
3 computers - 1 printer	£59.00c
Grafpad Graphics Tablet	£125.00c
GRAPHICS Plotter	£270.00a

COLOUR/GREEN MONITORS (leads incld)

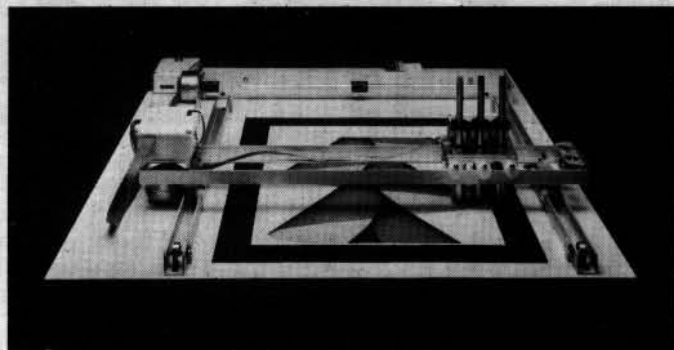
Microvitec 1431 14" RGB Std Res	£215.00a
Microvitec 1431P 14" RGB/PAL Std Res	£249.00a
Microvitec 1431PS 14" RGB/PAL + Sound	£259.00a
Microvitec 1451 14" RGB Med Res	£325.00a
Microvitec 1441 14" RGB Hi Res	£440.00a
Microvitec 2031 20" RGB Std Res	£287.00a
KAGA Vision 12" RGB Std Res	£230.00a
KAGA Vision III 12" RGB Hi Res	£385.00a
KAGA 12" Green Hi Res	£106.00a
SANYO DM812CX 12" Green Hi Res	£99.00a
KAGA RGB Lead	£6.50d
BNC Green Screen Monitor Lead	£3.50d

BBC COMPATIBLE 5.25" DISC DRIVES:

(All include cables, manual + format disc)	
100K (40 Track)	£150.00a
100K (40 Track) with psu	£185.00a
200K (40/80 Track)	£180.00a
200K (80 Track) with psu	£260.00a
400K (80 Track DS)	£195.00a
2x100K (40 Track) with psu	£320.00a
2x200K (40/80 Track) with psu	£400.00a
2x400K (80 Track DS) with psu	£420.00a
Accessories:	
40/80 Track Switching Module	£30.00c
Single Disc Cable	£6.00d

ALL PRICES EXCLUDE VAT. Please add carriage 50p

COLOUR GRAPHICS PLOTTER:



This robustly built 3-colour graphics plotter provides both versatility & precision. The carriage can be moved with an accuracy of 0.025cm. over an area the size of A4 paper. The plotter bed can accept paper & far thicker materials, at sizes of up to A3. The basic plotter carries three pens each of which is software selectable. Optional accessories that can be fitted include: Scriber, miniature drill, router, and optical sensor for scanning. This versatile plotter can provide an endless source of creative ideas.

Everything you need for your BBC Computer

Plus friendly service and professional advice

Double Disc Cable	£8.50d
DISCS 40T SS/SD Pkt of 10	£15.00c
DISCS 80T SS/DD Pkt of 10	£24.00c
DISCS 40T DS/DD Pkt of 10	£18.00c
DISCS 80T DS/DD Pkt of 10	£26.00c
FLOPPICLENE Drive Head Cleaning Kit	£14.50c
Disc Library Case	£2.50d
Disc File Case 30/40	£8.00c
Disc Lockable Case 30/40	£16.00c
Disc Lockable Case 60/70	£30.00b

EPROMS:	
2764-250Ns	£7.00
27128-300Ns	£18.00
27128-250Ns	£22.00

SOFTWARE:	
GEMINI BUSINESS including Database Mail-List, Beebealc, Beepilot, Stock-Control, Home Accounts, Above on Cassette	£17.25c
Above on Disc	£20.25c
CashBook on Disc	£52.00c
Final Accounts on Disc	£52.00c
Cashbook/Final Accounts both	£82.00c
GEMINI Leisure - Full Range	
TABS BUSINESS SOFTWARE FOR TORCH	
Sales Ledger (CP/N)	£99.00c
Purchase Ledger (CP/N)	£99.00c
Mailing List (CP/N)	£99.00c
ACORNSOFT - Full Range	
ACORN LANGUAGES including BCPL, LISP	
FORTH with Manuals	
BBCSOFT - Full Range	
PROGRAM POWER - Full Range	
ACORNSOFT (Electron) - Full Range	
BEEBUGSOFT - Full Range	

CASSETTE RECORDERS:	
SANYO DR101 Data Recorder	£34.00b
Datex Slim Line	£24.00c
BBC Tape Recorder	£28.50b
Cassette Lead	£3.00d
HOBBIT Floppy Tape	£135.00b
HOBBIT Zero Memory Option	£25.00d
Computer Grade C-12 cassette	£0.50d
Computer Grade Cassette 10 off	£4.50c
Phillips Mini-data cassette	£3.00d

BBC BOOKS (NO VAT) p&p £1.50/book	
Advanced User Guide (p&p £2)	£12.95
Advanced 6502 Assy Lang Prog	£10.25
CP/M Handbook	£10.75

Micros Interfacing Techniques	£13.05
Programming the 6502	£9.75
6502 Applications	£9.75
BBC Computer Books	
Assembly Lang Prog for BBC Birnbaum	£8.95
Assembly Lang Programming on BBC Micro by Ferguson and Shaw	£7.95
Basic Prog for BBC	£5.95
BBC an Expert Guide	£6.95
Micro Revealed	£7.95
Easy Programming on BBC	£5.95
Further Programming on BBC	£5.95
Games BBC Computer Play	£6.95
Introducing BBC Micro	£5.95
Let Your BBC Teach You	£6.45
Programming The BBC	£6.50
30 Hour Basic	£5.95
35 Educational Programs	£6.95
BBC Sound & Graphics	£7.95
Creating Adventure Programs	£6.95
Discovering Machine Code	£6.95
Structured Programming	£6.50
Assembly Language Shiva	£7.95
6502 ALP	£12.50
Using the 6502 Ass Lang	£14.50
6502 Machine Code for Beginners	£5.95
6502 Software Design	£10.25
BBC Basic (Melbourne)	£7.95
ALP on BBC Addison	£7.95
BBC Graphics and Sound	£6.95
Advanced Prog Techniques	£7.95
Programming the Z80	£12.10
Forth Acorn	£7.50
Using Floppy Disk with the BBC Micro	
Computer Cumana	£7.50
BCPL User Guide Acorn (p&p £2)	£15.00
LISP Acorn	£7.50
Creative Graphics Acorn	£7.50
Graphs and Charts Acorn	£7.50
The Friendly Computer Book BBC	£4.50
Beyond Basic BBC	£7.25
Into View BBC Word Processor	
Acorn	£2.50
Advanced 6502 Interfacing	£10.95
Electron	
Start Programming with the Electron	£7.95
Assembly Language Programming on the Electron	£7.95
The Electron Book	£7.95
Basic Sound and Graphics	
6522 Book	£3.25

MANY MORE BOOKS IN STOCK

ACORN IEEE INTERFACE

A full implementation of the IEEE488 standard, providing computer control of compatible scientific & technical equipment, at a lower price than other systems. Typical applications are in experimental work in academic and industrial laboratories. Phone for details. **£282.**

TELETEXT

Converts your BBC into a fully fledged Teletext Terminal. In addition to normal reception of Teletext pages, it is able to 'download' software as well as saving standard pages on any of the four TV channels. **£196.**

ULTRACALC

With advanced features, such as: *Handling of labels as well as numbers, as values, allowing the search of a list by a meaningful name, instead of just a number. *Efficient memory usage allowing large spreadsheets to be constructed. *Variable width columns.

It helps you to create and manipulate *Budgets *Cash-Flow forecasts *Price Lists *Balance Sheets *Time Sheets *Order Entry *Small Databases *Scientific Calculations etc. **£65.**

MICROTEXT

Developed by the National Physical Laboratory, is a programming system designed to simplify the production of a wide range of man-computer dialogues. Using MICROTEXT, an expert in any field can construct their own complete courses of computer-based instructional material. Applications include interviewing systems, teaching packages, training courses and interactive demonstrations and simulation. **£43.35p**

RH LIGHTPEN:

The Acorn-approved superior design, with a programmable 'push tip' switch, status indicator LED and an interface box. Supplied complete with manual, full software and basic demo programs. Colour graphics programs will be available separately.

INSTITUTIONS & EDUCATIONAL ESTABLISHMENTS

Our bulk purchasing power enables us to provide very competitive quotations, as well as being able to supply in quantity, a very wide range of equipment, accessories and spare parts from stock.

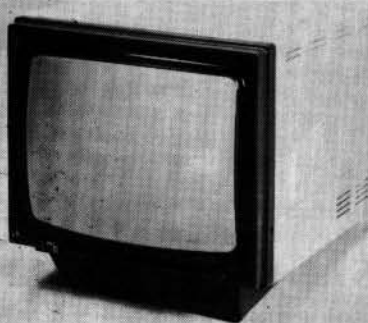
GRAFPAD

A low cost graphic-tablet offering the performance and durability required for the business, industrial and educational user. It is small, accurate & reliable. Working area: 240 x 192mm + Menu area. **£125.**

SEE OUR OTHER ADVERTISEMENTS ON PAGE... 10

MONITORS:

MICROVITEC—a range of British Made DTI/ACORN approved Std/Med/Hi-resolution RGB colour monitors that have a consistent, reliable performance. Also available in RGB/PAL/SOUND versions. The KAGA range provides a similar performance in 12" screen format. Our Japanese manufactured Hi-Res green screen **SANYO** is an ideal solution for high clarity 80 column text display. The **KAGA** green screen, with its 'chemically etched' anti-glare screen for the discerning user. All monitors are supplied with suitable leads at no extra charge.



MAIL ORDERS TO: 17 Burnley Road, London NW10 1ED
(Tel: 01-452 1500, 01-450 6597 Telex 922800)

SHOPS AT: NW London: 15 Burnley Road, London NW10 1ED
(Dollis Hill 2 mins walk, ample car parking space)

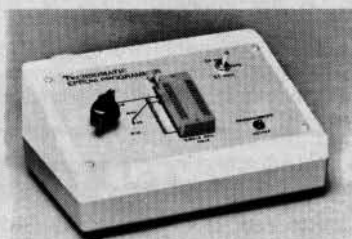
West London: 305 Edgware Road, London W2. Tel: 01-723 0233
(Near Edgware Road 2 mins walk)

TECHNOMATIC LTD.

All prices exclude carriage & VAT. Please add carriage as indicated and add 15% VAT to the total order value. For fast delivery telephone your order quoting VISA or Access card or official order number. (Minimum telephone order £5).

EPROM PROGRAMMER:

A fully self-contained mains-powered eprom programmer housed in an attractive finished case. It is able to program 2716, 2732/32A, 2764 & 27128's in a single pass. It is supplied with vastly superior software when compared to any currently available similar programmer. In addition to normal eprom programming, you are now able to load your favourite basic programs onto eprom.



* **Menu Driven Software provides user friendly options for programming the eprom with:**

- a) Basic programs.
- b) Ram resident programs.
- c) Any other program.

* **Programmer can read, blank-check, program & verify at any address/addresses on the Eprom.**

* **Personality selection is simplified by a single rotary switch.**

* **Programming voltage selector switch.**

* **Full Editor with ASCII Disassembler, allowing direct modification of memory data in HEX or ASCII.**

* **Continuous display of time left for completion of programming.**

* **Continuous display of current addresses as they are being programmed.**

The programmer comes complete with cables, software & operating manual.

£89 + £2.50 carriage. Software on disc £2 extra.

EPROM ERASERS



UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 + £2 p&p.**
UV1 as above but without the timer. **£47 + £2 p&p.**

BEEBUGSOFT

A professional range of Firmware/Software to suit both the advanced programmer and the user. From the well known 'EXMON' and 'TOOLKIT' to the WORDWISE SPELLCHECK.

SMARTMOUTH:

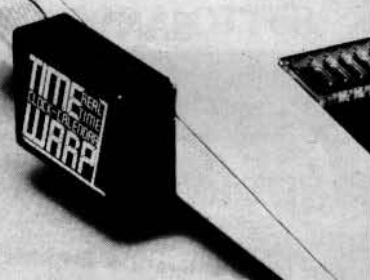
WITH AN INFINITE VOCABULARY—

A ready built speech synthesiser unit, allowing the creation of any English word, with both ease and simplicity, while, at the same time being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications—these include industrial, commercial, educational, scientific, recreational etc. No specialist installation—simply plugs into the user port—and due to the simple software, no ROMs are needed. SMARTMOUTH is supplied with demo and development programs on cassette, and full software instructions. **£37 + £2.50 carriage.**



'TIME-WARP' REAL-TIME-CLOCK/CALENDAR

A low cost unit that opens up the total range of Real-Time applications. With its full battery backup, possibilities include an Electronic Diary, continuous display of 'on-screen' time and date information, automatic document dating, precise timing & control in scientific applications, recreational use in games etc—its uses are endless and are simply limited by one's imagination. Simply plugs into the user port—no specialist installation required—No ROMs. Supplied with extensive applications software. **Please phone for details. £29.00 + £2.50 carriage.**



**SPECIAL
OFFER
EPSON FX 80
PRINTER
ONLY £325**

including BBC printer lead
Twelve Months full warranty.
Valid on orders placed
before 31st March.

TECHNOMATIC IS AN OFFICIAL BBC DEALER

In addition to the items mentioned in our advertisements, we carry extensive stocks of: connectors, connector assemblies, components including TTLs, CMOS, RAMs, EPROMs and CPUs. Spares for the BBC computers are normally available from stock. Orders from government departments, public bodies, hospitals, schools, colleges, universities and recognised PLCs welcome.

See our double page
spread advertisement
8-9

MAIL ORDERS TO: 17 Burnley Road, London NW10 1ED
(Tel: 01-452 1500, 01-450 6597 Telex 922800)

SHOPS AT: NW London: 15 Burnley Road, London NW10 1ED
(Dollis Hill 2 mins walk, ample car parking space)

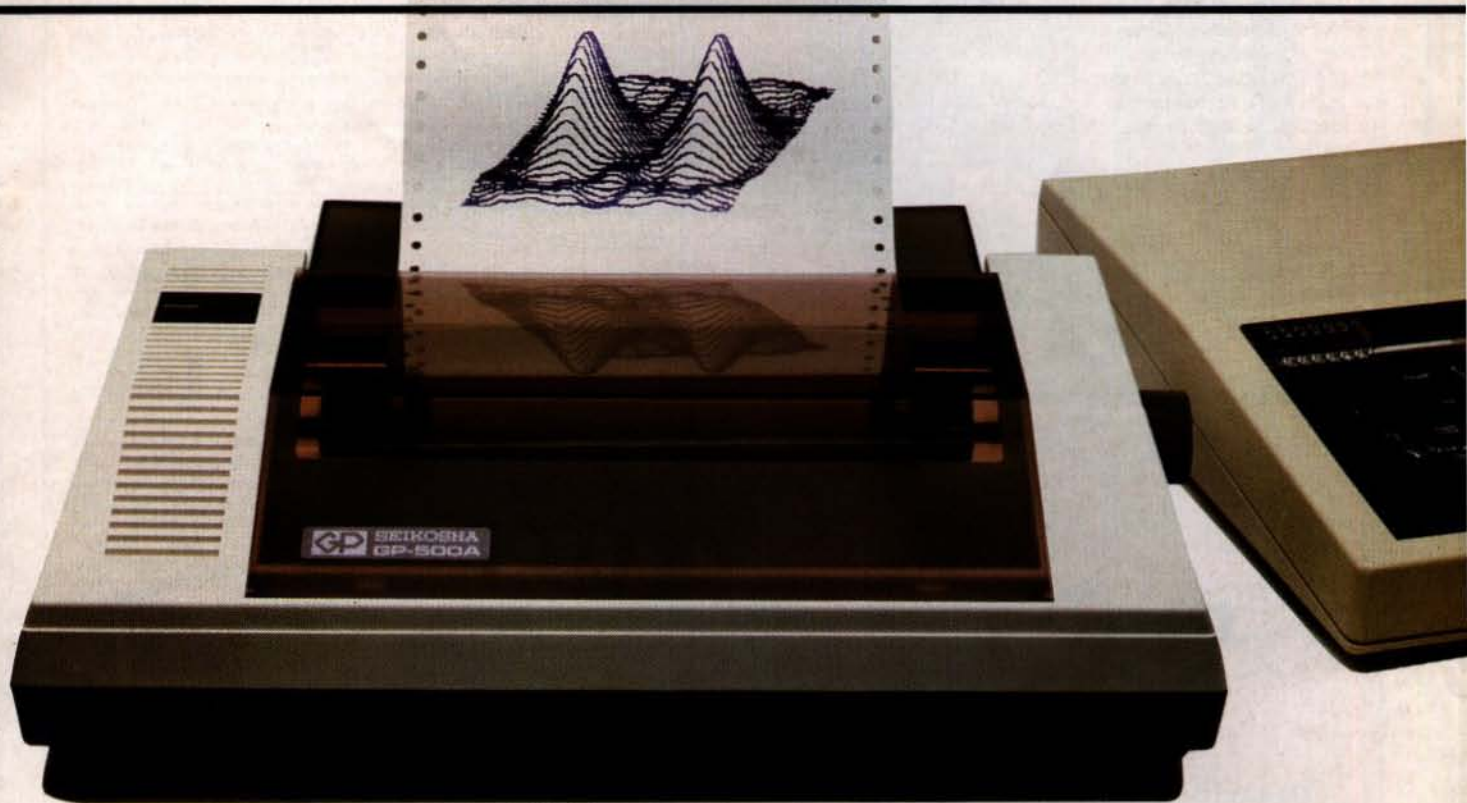
West London: 305 Edgware Road, London W2. Tel: 01-723 0233
(Near Edgware Road 2 mins walk)

TECHNOMATIC LTD.

All prices exclude carriage & VAT. Please add carriage as indicated and add 15% VAT to the total order value. For fast delivery telephone your order quoting VISA or Access card or official order number.
(Minimum telephone order £5).

WHAT'S ON BBC?

READ ALL ABOUT IT FOR ONLY £249.



Even with such a versatile workhorse as your BBC Micro, you've got problems.

For example, supposing you want a permanent record of important graphics? Or need to eliminate glitches from a lengthy program? Fast.

Without a printer you're stuck.

And up to now, even if you had a printer that could play in the same league as your BBC, you were stuck - with a price tag running into three or four hundred pounds.

The Seikosha GP500A changes all that.

It's got full graphics capability, with a single command enabling you to repeat a column of graphic data as many times as you like.

Its printing speed is 50 characters a second in an 80 column dot-matrix format on standard width paper adjustable up to 10 inches.

And under its sleek casing, there's a wealth of sophisticated features. Like automatic printing (no data lost due to overflow), intermixing of all modes on a single line and printing of one copy as well as the original.

All for only £249.00.

No, you didn't misread. The Seikosha GP500A complete with BBC interface cable costs only £249.00.

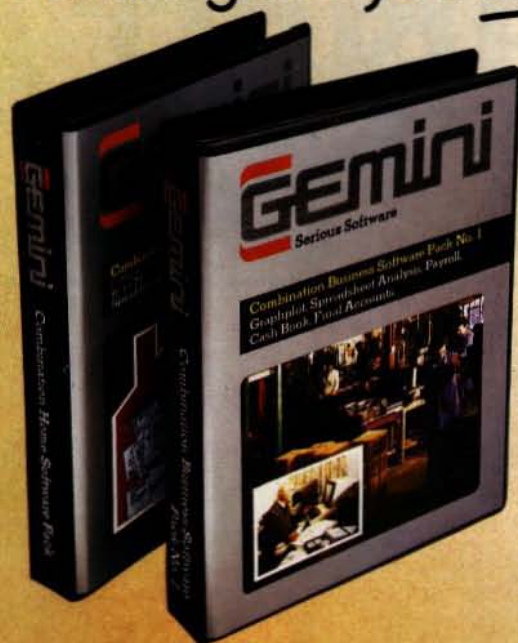
See the GP500A in action - phone for details and the address of your nearest dealer.

SEIKOSHA DRG

DRG Business Systems, Peripherals Division, 13/14 Lynx Crescent, Winterstoke Road, Weston-super-Mare, Avon BS24 9DN.
Telephone: 0934 419914. Telex: 444761.

Business or Pleasure...

Gemini gives you **MORE!**



Gemini Combination Packs... designed to offer maximum value and convenience to the serious business or home user by combining several programs in one pack.

Other Titles
MORE choice!

Gemini Serious & Leisure Software... twelve serious titles for fourteen popular home micros, including **PAYROLL**, the ideal program for all wage calculations for up to 40 employees, with all PAYE and SSP tables held in memory... **WORD PROCESSOR**, with features including block delete, block insert, search and replace, edit text, display text, etc... **HOME ACCOUNTS**, for cost effective household management, plus ten really excellent games for all the family to enjoy. All on cassette or disk at prices ranging from £7.95 to £59.95 and available from larger branches of WH Smith, Boots and most good software dealers, or write to:

New
Combination Packs
MORE Value!

Combination Business Pack No. 1

Contains: Graphplot, Spreadsheet Analysis, Payroll, Cash Book, Final Accounts

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.0113 BBC 32K Cassette	199.95	159.95	40.00
D.0113 BBC 32K 40 Track Disk	207.75	159.95	47.80
E.0113 BBC 32K 80 Track Disk	212.75	159.95	52.80

Combination Business Pack No. 2

Contains: Database, Stock Control, Word Processor, Mailist, Invoices & Statements

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.0114 BBC 32K Cassette	99.75	79.95	19.80
D.0114 BBC 32K 40 Track Disk	119.75	79.95	39.80
E.0114 BBC 32K 80 Track Disk	124.75	79.95	44.80

Combination Business Pack No. 3

Contains: Database, Stock Control, Spreadsheet Analysis, Invoices & Statements, Mailist

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.1615 ELECTRON	99.75	79.95	19.80

Combination Home Pack No. 1

Contains: Database, Home Accounts, Mailist, Spreadsheet Analysis, Graph Plot

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.0115 BBC 32K Cassette	99.75	79.95	19.80
D.0115 BBC 32K 40 Track Disk	119.75	79.95	39.80
E.0115 BBC 32K 80 Track Disk	124.75	79.95	44.80
C.1616 ELECTRON	99.75	79.95	19.80

Combination Home Pack No. 2

Contains: Database, Home Accounts, Graph Plot, Mailist

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.0417 SPECTRUM 48K	79.80	59.95	19.85



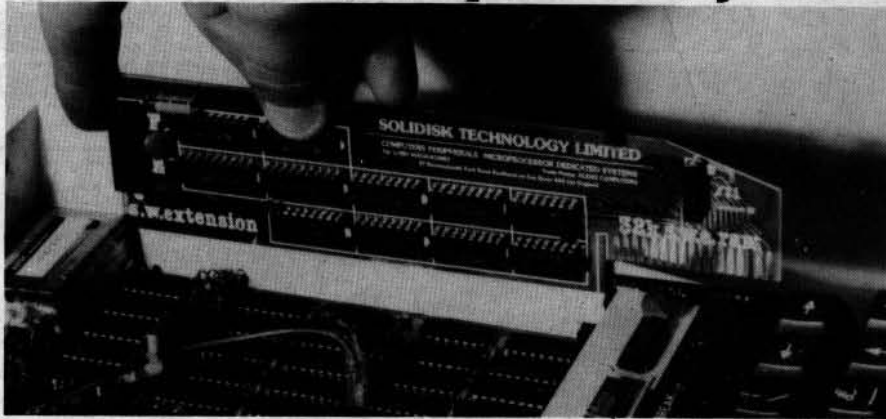
Electron Programs
MORE Available!

Gemini

Gemini Marketing Limited

18a Littleham Road Exmouth Devon EX8 2QG England
Telephone (0395) 265165/265832 Telex 42956 Attn Gemini
Micro Computer Software

The BBC-Sideways RAM System



The BBC Sideways RAM:

The most exciting add-on for the BBC micro, which many have been waiting for Acorn to produce!

What is the Sideways RAM?

The sideways RAM is a 16K (upgradable to 128K) memory board which fits into the rightmost ROM socket on your BBC micro. The sideways RAM is an essential piece of hardware for any BBC computer. Strategically integrated into the BBC system, the system CAN:

Answer definitively to shortage of Sideways ROM sockets:

The Sideways RAM is capable of running sideways system software such as languages, wordprocessor, electronic spreadsheet, etc.

Increase free memory for languages, add more entries to disk:

The sideways RAM can also be used to increase available memory by moving disk workspace into sideways RAM. PAGE is then set to the lowest possible value i.e. &0E00 thus rendering tape based software fully compatible with Acorn's disks. Furthermore, the disk directory is given extra space so that the maximum number of entries is increased from 31 to 154. Clearly, there is no way that other disk filing systems can offer such performance.

Increase text space for wordprocessor:

The Sideways RAM can also be used to increase effectively WORDWISE's text capacity from 24K to 32K or to a full 64K with the Silicon Disk. With the Sideways RAM system, you can create a whole chapter of a book in a single file! Machine code programmers using the Sideways RAM facilities are exceptionally favoured: the system can create assembly modules of up to 64K in size, up to 24K of space for labels and variables. A typical 8K machine code can be assembled in 2 minutes by BASIC, even directly to Sideways RAM.

Add a silicon disk to your computer:

If you have 128K of sideways RAM, part of it (112K) can be turned into a silicon disk. If you have a single drive, the system will address your floppy disk as drive 0 and the silicon disk as drive 1 (or 4 if you have 2 or more) but with a difference! The silicon drive has the capacity to load a 24K program faster than you can remove your finger from the 'RETURN' key with no clicking noise, no on/off LED, no wear. It can make you a backup floppy in 15 seconds from the original, proofread your wordprocessor texts nearly as fast as your own speed or re-create a relocatable, documented source code from an 8K ROM in minutes. The sheer speed of sideways RAM is absolutely ideal for programs like BEEBUG'S MASTERFILE (database applications), SPELLING CHECKER, VIEW (word-processing), Computer Concepts GRAPHIC EXTENSION (LOGO, Sprites etc.), BASIC, PASCAL, BCPL etc. Many other applications including games like ADVENTURE or CHESS will benefit from the ability of the Sideways RAM to make colourful 3D-graphic look like a movie picture or retrieve any record in milliseconds. With the Solidisk fitted, the BBC outperforms most 16 bit machines.

Free software with every sideways RAM system:

The Sideways RAM comes already with lots of free software (on a 40 track single sided diskette). Sideways system software is free to all STL users, now and for future additions. All programs are given in basic source code and you are encouraged to personalise. Benevolent contributors will be rewarded with free hardware gifts. For example: 'STLOE00' and 'STL154' to set PAGE = &0E00 and allow 154 possible filenames, 'STLDISC' to create and maintain the SILICON DISK with extra commands like 'FORMAT', 'VERIFY' and 'DCOPY', 'WORD32' and 'WORD64' to increase text size for WORDWISE to 32K or 64K characters, STLASM to produce very large (up to 100K) assembly programs and a few other demonstration programs. Soon to be released: STLBASIC to run basic programs right in the Silicon Disk.

Increase the computer power by increasing sideways RAM:

The power of the BBC relies on its intelligent use of software where several sideways ROMs execute different tasks such as filing, calculating, drawing, processing, playing music, talking, compiling, debugging etc. The bigger the sideways RAM, the bigger the task the computer can handle.

Beautifully designed, easily installed, no soldering required:

The sideways RAM was first introduced and the first issue sold out at the ACORN USER SHOW (Sept. 83, London). The new issue has been exhibited at the PCW SHOW (Oct/Nov. 83, London), was on general distribution release at the BBC USER SHOW (Dec. 83, Westminster, London), reviewed by all major BBC micro magazines and user clubs and since then every week, hundreds of BBC users discover the convenience of the Sideways RAM system. You can install it in 2 minutes and do not need to solder.

You can buy the 128K Solidisk now or a 16 or 32K Sideways RAM and upgrade it later if you needs grow.

Further upgrading is very simple: from 16K to 32K is by straight exchange (cost: £15 + p&p), from 32K to 128K is by plugging in the SOLIDISK extension (see figure 3) onto the 32K sideways RAM. It costs just £85 plus p&p.

You can also take advantage of the cheap hardware add-ons such as EPROM PROGRAMMER (£15) and EPROM ERASER (19.95) designed specially to compliment the sideways system.

Soon Available: Solidisk's Floppy Disc Systems:

STL also produce DISK PACKS which comprise all the necessary IC's, DFS ROM, manual, connecting cables, demonstration diskette in different storage capacities ranging from the basic 100K disc system to 1.8MB dual drive system. Both single density and double density are supported, fully compatible with ACORN disk system and the sideways RAM system. The choice of single or dual density is yours and there is virtually no difference in price.

SINGLE DENSITY DISK SYSTEM: based on the Intel 8271, the single density disk interface consists of a set of IC's to be added directly to the BBC board and is comparable to Acorn's disk interface upgrade. You choose 1 or 2 drives (up to 4 drives are supported), they are all half height units and usually come from TANDON, SHUTGUART, TEAC or CANNON with capacity ranging from 100K to 400K per drive (switchable). The single density disc system uses normal FM/IBM compatible recording technique, soft sector 5 1/4" diskettes commonly available. Discs formatted with this system has 10 sectors of 256 bytes per track (2.5K bytes), a 40 track drive will offer 100K of storage using this system, a 80 track drive will offer 200K bytes and a double sided 80 track drive 400K, only 2 of the later can be used on the BBC. The real advantage of the single density disc system is neatness: the disc chip set goes neatly on the BBC board.

DUAL DENSITY DISK SYSTEM: based on the NEC 765A, the dual density disk system offers both single density and double density using MFM recording technique. The disc interface comprises a set of IC's and a small module plugging into socket 78. The advantage of the dual density disc system is the nearly twofold increased storage capacity with the same disc drive. For price information, please refer to ordering coupon below.

Detachable Keyboard Case and Integral Computer/Disk Case:

To compliment the Single and Dual Density Disk systems, we have commissioned a large plastic moulding firm to produce a beautiful injection moulded housing for the keyboard alone and a sturdy replacement case top for the BBC computer capable of accommodating 2 disk drives and supporting a colour monitor.

Epson Printers and Sanyo Colour Monitors, Magnetic Media:

We stock the whole range of EPSON PRINTERS, SANYO COLOUR MONITORS, VERBATIM, etc. floppy discs at very competitive prices.

THE BBC SIDeways RAM SYSTEM SOLIDISK TECHNOLOGY LIMITED

HEAD OFFICE: 17 SWEYNE AVENUE
SOUTHEND ON SEA, SS2 6JQ
TEL: (0702) 354 674/5

Item

BBC 16K Sideways RAM (SWR16)	£39.65
BBC 32K Sideways RAM (SWR32)	£54.95
BBC 128K Sideways RAM (Solidisk)	£139.95
2764/27128 EPROM Programmer for STL Users	£15.00
2764 Blank EPROMs, pack of 5	£30.00
27128 Blank EPROMs, pack of 5	£60.00
UVIPAC, 15 minute EPROM Eraser	£19.99
Please add £1 post and packing.	

Single Density Disk System incl. Drive, Interface, DFS ROM, Leads and Manual:

100K Disk Pack	£219.00
200K (Single Drive) Disk Pack	£269.00
2 x 200K D/S Single Drive Disk Pack	£319.00
2 x 200K (Dual Drive) Disk Pack	£490.00
2 x 400K (Dual Drive) Disk Pack	£589.00

Dual Density Option: Please tick ☐

Detachable Keyboard Case and 24" Cable	£19.99
CPU Case	£10.00
Sanyo 14" Colour Monitors:	
Normal	£199.00
Medium (ideal for BBC)	£299.00
Very High Res. for Cad Works	£399.00
Please add £5 carriage costs.	

EPSON PRINTERS FROM £199.00, RING FOR DETAILS.

*Please delete/complete as applicable
*I enclose a cheque/
P.O. payable to:
SOLIDISK
TECHNOLOGY
LTD
for: £ _____

Please charge my Access, Barclay account: TOTAL £ _____

NAME	
ADDRESS	

Home & Business Computers

THE NORTH'S LEADING COMPUTER SUPPLIERS

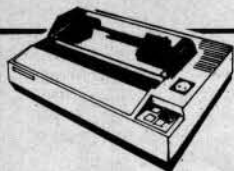


HARDWARE

BBC A	£299.00	inc free
BBC B	£399.00	Cassette
ELECTRON	£199.00	lead.
BBC A with 32k and VIA	£345.00	
<i>(runs all 'B' software)</i>		
BBC Cassette Player	£29.95	

DEAL 1

BBC Model B
LVL Double Density Disc
Interface (100K = 180K)
100K 40 track Disc Drive **£639.95**
Cables, Format Disc, Manual (p&p £5.00)

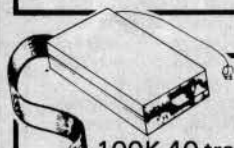


PRINTERS

Seikosha GP 100A	£199 inc cable
Shinwa CP 80	£275 inc cable
Epson RX 80 F/T	£309 inc cable
9 1/2" x 11" Fanfold paper	£12.95

DEAL 2

BBC Model B
LVL D/D Disc Interface
100K 40 track Disc Drive **£884.95**
Shinwa CP80 Printer (p&p £10.00)
Word Processing Package
Cables, Format Disc, Manual



DISC DRIVES

100K 40 track S/S	£179.95
200K 40 track D/S	£229.95
200K 40 track Dual S/S	£338.00
400K 40/80 track D/S	£299.95
<i>(inc cables, manual and formatter)</i>	
Acorn Disc Interface	£79.00 <i>(fitted)</i>
LVL Double Density D/1 (100k = 180K)	£90.00 <i>(fitted)</i>

KNOW YOUR BBC

VHS or Beta video cassettes by Master Class providing
an excellent way of learning about your BBC computer.
Tape 1 - Starting to Learn Basic **£19.95**
Tape 2 - Further Basic **each.**
Tape 3 - Introduction to the Electron
Tape 4 - BBC and the Primary Teacher
*Hire available - returnable deposit £15 - £3 per week. 50p p&p.
(Tapes for Spectrum available)*

ACCESSORIES

Concept Keyboard A4	£79.00
Concept Keyboard A3	£113.00
Concept Keyboard Interface	£18.00
Edinburgh Turtle (BBC)	£189.75
Economatics BBC Buggy	£189.00
Microrobotics "Beasty"	£49.95
Standard Servo for "Beasty"	£14.50
Grafpad Graphics Tablet (Disc or Tape)	£143.00
Hobbit Floppy Tape System	£155.25
Quickshot Joystick	£15.50



DISCS (per 10 pack)

40 track SS/SD	£19.95
40 track SS/DD	£22.50
40 track DS/DD	£25.00
80 track SS/SD	£27.50
80 track DS/DD	£29.50

Full range of software by:
*Acornsoft, Doctor Soft, BBC Soft, Superior
Software Program Power, Bug Byte + many more!*

EDUCATION AND BUSINESS USERS

We offer:

- Wide range of Business and Educational Software.
- Educational and bulk order discounts.
- Warranty and post warranty maintenance.
- On site maintenance if required.
- Collection and delivery of repairs if required.

*Contact Frank Ratcliffe
on 061-633 1608*

All prices
include
VAT

Mail order
to Oldham
address

Carriage
£5.00 per
machine
UK mainland

Send for
FREE
brochure



Access
Barclaycard

54 Yorkshire Street
Oldham
Tel: 061-633 1608

73 Yorkshire Street
Rochdale
Tel: (Rochdale) 344654

59 Daisy Hill
Dewsbury
Tel: 0924 455300

ANOTHER FANTASTIC NEW B.B.C. MICRO
PROGRAM FROM BRITAIN'S
LEADING SOFTWARE
HOUSE!

BUMBLE BEE

ONLY
£7.95

Send the busy bee
scurrying around the sprawling
corridors to collect the precious pollen.
Spin the turnstiles to escape the scavenging
spiders in hot pursuit and use your skill and dexterity
to coax them into the raging fireballs.
Fast action, colourful graphics and top quality sound
combine to make another winner from MICRO POWER.



The following top titles are available for both the
BBC Micro and Electron: Killer Gorilla £7.95/
Moonrider £7.95/Bandits at 3 o'Clock £6.95/
Croaker £7.95/Felix in the Factory £7.95/
Felix and the Fruit Monsters £7.95/Chess £7.95/
Escape from Moonbase Alpha £7.95/Draw £9.95/
Swoop £7.95/Intergalactic Trader £8.95/
Positron £6.95/Cybertron Mission £7.95.

All prices inclusive of V.A.T.

Mail Order: Please add 55p per order P. & P.

WE GUARANTEE THAT ALL OUR ADVERTISED PROGRAMS
HAVE BEEN COMPLETED AND ARE READILY AVAILABLE.

Showroom:

Northwood House
North Street
LEEDS LS7 2AA
Tel: (0532) 458800

Mail Order:

8/8a Regent Street
LEEDS LS7 4PE
Tel: (0532) 683186
Or: 696343

WRITTEN ANY
PROGRAMS?
WE PAY 20%
ROYALTIES!

SPECIAL
OFFER
Deduct £1 per
cassette when
ordering two or
more.



WE STOCK THE
BBC MICRO, ELECTRON,
MEMOTECH MTX 500,
COMMODORE 64, ORIC-1
AND SPECTRUM.

B.B.C. MICRO AND
ELECTRON PROGRAMS
CAN BE OBTAINED FROM
SELECTED BRANCHES OF
W.H. SMITH, JOHN MENZIES,
BOOTS, HARRODS, ALL GOOD
DEALERS, OR DIRECT
FROM MICRO POWER.

Small business can now stop going by the book.

For under £1,000 a small business can now equip itself with a BBC Microcomputer, a disc drive, a word processor and printer.

(All tax deductible by the way.)

Once you've parted with that money, you'll find that business has never been brisker.

Because now, there's a new series of floppy disc software specially for the smaller business.

It has been developed by Acornsoft, the software division of Acorn Computers who are the manufacturers of the BBC Micro.

For only £24.95, each disc can store volumes of vital bookwork which can be updated and amended in a fraction of the conventional time.

And there is a disc to cover most aspects of paperwork and book-keeping.

The Invoicing package.

This program stores details of products, VAT numbers and, of course, the names and addresses of your customers. As orders come in, you simply record them. Then, when it's time to invoice, you just press a few keys and each invoice or credit note is printed automatically in seconds.



Allowing for variable terms of trading, the system calculates and prints discounts. And it should help to improve your cash flow dramatically.

The Order Processing package.

With this program, you can confirm your customers' orders, prepare and print despatch notes and make fast analyses of individual orders or of all the orders stored on disc.



The Accounts Receivable package.

Now, it couldn't be easier to keep your customer accounts under control.

In an instant, you can analyse debtors, produce statements, keep a check on any credit limit and calculate VAT output automatically.



Using this package in conjunction with the invoicing package, you can also keep tabs on payments received against payments outstanding.

The Accounts Payable package.

This package will keep you fully up-to-date on how much you owe and who to. In addition, it calculates



input VAT and, used with the Accounts Receivable package, produces instant VAT returns.

It also highlights settlement discounts, produces remittance advices and provides an immediate analysis of all creditors.

The Stock Control package.

Touch a few keys and you have instant access to stock status and automatic analysis by quantity and value.

Consequently, it's easy for you to maintain correct stocking levels, having an early warning of out-of-stock situations or the likelihood of over-stocking.



The Purchasing package.

All your suppliers' names and addresses go onto the disc. Then they can be retrieved instantly for preparing and printing orders.

All order data can be recalled in seconds, allowing you to check on orders, and suppliers' invoices and to record all deliveries.



The Mailing package.

Instead of the shotgun method of sending mailshots, this package enables you to refine each mailing down to the customers who are most likely to respond.

It gives you a rapidly accessible mailing file of your customers, according to any criterion you choose. Size of company, for instance, or type of business.



Average value of the business they do with you, or whether they are good or bad payers.

Then, when you are doing a mailing, you simply choose the group or groups of customers you want.

At £24.95 each, these packages could be priceless.

Each package comes with clear instructions on how to get the program running so that you can devote much more of your time to more profitable activities.

If you're a credit card holder, you can order any or all of the packages by ringing: 01-200 0200 anytime. Or 0933 79300 during office hours.

(By ringing the same number, you can get the address of your nearest stockist, or full details of the BBC Microcomputer system if you don't already have one.)

Alternatively, you can order the packages by sending the order form below to: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please allow 28 days for delivery.

☎ Credit card holders, phone 01-200 0200, anytime. Or 0933 79300, during office hours.

To: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.
Please send me the following business software packages at £24.95 each.

PROGRAM	QUANTITY	TOTAL	(Code Acornsoft use only.)
Invoicing			SNB 08
Order Processing			SNB 12
Accounts Receivable			SNB 10
Accounts Payable			SNB 13
Stock Control			SNB 11
Purchasing			SNB 14
Mailing			SNB 09
TOTAL			

I enclose PO/cheque payable to Acornsoft Ltd. Or charge my credit card.

Card Number _____

Amex/Diners/Visa/Access (Delete)

Please send me details of the BBC Microcomputer System ☐

Name _____

Address _____

Postcode _____

Signature _____

Registered No. 1524763

VAT No. 215 8123 85

ACORNSOFT

The invasion has begun... for BBC Model B

Let excitement invade your home computer!
Travel to Alpha Centauri. Enter the Vortex.
Command the ground missiles, or join the
shoot-out at the O.K. Corral!

ATTACK ON ALPHA CENTAURI

For the BBC Micro Model B

...he punched the key, and
the control monitor filled
with the picture of
bug-eyed wasps attacking
from their volcanic nest;
decisively he dived to the
left and his laser gun burst
into action...
3D ACTION, EXPLOSIVE
SOUND EFFECTS
BBC MODEL B
£7.95 CASSETTE
£11.95 DISK

VORTEX

For the BBC Micro Model B

...there was no escape, he
had to enter the Vortex and
bet on his skills! He
grabbed the manual
controls and with
determination fired both
upper deck guns...
KEYBOARD OR JOYSTICK,
EXCELLENT SOUND
BBC MODEL B
£7.95 CASSETTE
£11.95 DISK

3D BOMB ALLEY

For the BBC Micro Model B

...the continued thunder
of the hissing ground
missiles had long now
deafened him - unless he
had some of those
bombers down, the fleet,
in the small stretch of
water was a sitting
duck...
3D ACTION, SOUND
EFFECTS, BEAUTIFUL
GRAPHICS
BBC MODEL B
£7.95 CASSETTE
£11.95 DISK



For the BBC Model B

...the movement of the
saloon-bar door was all the
warning he needed! At the
speed of light his hand
moved toward his holster,
while a sixth sense
warned him of the upper
floor window...
3D ACTION, SOUND
EFFECTS, BEAUTIFUL
GRAPHICS
BBC MODEL B
£7.95 CASSETTE
£11.95 DISK

Available from WH Smith, HMV, all
Spectrum shops and over 500 retail
outlets in the U.K.

Distributors, Multiple Store and
Retailer Group inquiries invited.

Do you write your own
programmes? If you have
an unusual programme
which can meet our
standards you could be
earning more than £250 p
week. Why not take
advantage of our sought
after reputation. Write no

SOFTWARE
INVASION

50 Elborough St.,
Southfields,
London SW18 5DN.
Tel. (01) 870 1197

HOW TO ORDER

You may purchase any of the Games
listed from most good BBC Software
Stockists, WH Smiths, HMV or your
nearest Spectrum Dealer.

To order direct, fill in the coupon below
with your requirements, make
cheque/P.O. payable to: SOFTWARE
INVASION and post to us. Please allow 7
to 14 days for delivery.

Post to: SOFTWARE INVASION 50 ELBOROUGH STREET SOUTHFIELDS LONDON SW18 5DN

(Title) (Qty.) £

☐ (TAPE) ☐ 40 TRACK
☐ (DISK) ☐ 80 TRACK (Please tick)

(Title) (Qty.) £

☐ (TAPE) ☐ 40 TRACK
☐ (DISK) ☐ 80 TRACK (Please tick)

(Title) (Qty.) £

☐ (TAPE) ☐ 40 TRACK
☐ (DISK) ☐ 80 TRACK (Please tick)

(Title) (Qty.) £

☐ (TAPE) ☐ 40 TRACK
☐ (DISK) ☐ 80 TRACK (Please tick)

Total £

I enclose my cheque/P.O. for £

NAME

ADDRESS

TEL: (Day) TEL: (Eve)

☐ I am a Distributor/Multiple/Retailer/Deale
Please contact me.

(Please delete whichever not applicable)

THE INTERNATIONAL VIDEO GAME OF THE YEAR COMPETITION
HERALDS THE "NEW AGE" IN VIDEO/COMPUTER GAMES

\$175,000 TO BE WON

**AND THAT'S
JUST FOR
STARTERS!**

CREATE A NEW VIDEO
GAME AND YOU COULD
MAKE YOURSELF A
MILLIONAIRE

IRP



International
Video
Game
of the
Year

Create a brilliant, new video game and you could be on your way to becoming a millionaire. This fantastic competition, organised by I.R.P. (The International Register of Independent Computer Programmers Ltd) and the famous Mark McCormack International Management Group, offers programmers and inventors the opportunity of a life time. There are huge, immediate cash prizes and the on-going revenue of 10% of the sales of all games to distributors throughout the world, plus the chance to appear on an international TV show. Your skill and imagination could bring you fame and fortune!

\$100,000 FIRST PRIZE! **PLUS** **FIVE \$15,000 RUNNER-UP PRIZES!**

Devise a totally original new video game in one of these categories: SPORTS, SIMULATORS, ARCADE, STRATEGY, ADVENTURE/FANTASY or a special section which covers programmes that are not necessarily games but have outstanding Educational or Entertainment merit. We'll also be announcing a number of 'MERIT' awards which will be entitled to carry the message 'An International Video Game of the Year MERIT AWARD' on their retail packaging. It's a great challenge. And the rewards, both financially and in terms of prestige, are tremendous. This is the most exciting competition ever for creative computer and video enthusiasts

**YOU'RE A TV STAR
TOO!**

All six winning games and their inventors will be featured on an internationally distributed, spectacular TV special. That's going to make your name!

HOW TO ENTER

Just send in your game, or games, programmed on cassette for any popular home computer. Use the coupon, today, and we'll send you all the facts you need.

**CLOSING DATE FOR ENTRIES IS
31st MAY 1984**

To: IRP Limited, Pinewood
Film Studios, Iwer, Bucks,
England.

Name

Address

.....

.....

.....

MU1

Electronequip in Hampshire

Authorised BBC Dealer &
Service Centre

SPECIAL OFFERS

PHONE FOR DETAILS

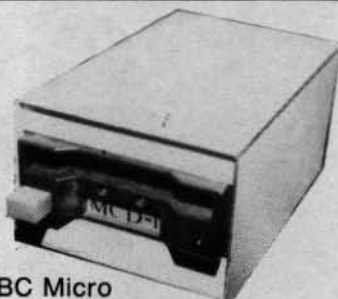


Electronequip is an authorised Acorn service centre and has been an Acorn dealer since the introduction of the Atom. Our demonstration facilities include 20 station Econet and Torchnet systems.

Ref.	BBC Micros	Ex VAT	Inc VAT
ANB01	BBC Model B Micro Computer	348.26	399.00
ANB02	BBC Model B with Econet Interface	389.14	446.00
ANB03	BBC Model B with Disc Interface	409.14	469.00
ANB04	BBC Model B with Disc & Econet Interface	450.01	516.00

3" Micro Disc £129.95 (inc. VAT)

Disc Interface & Drive £198.95 (inc. VAT)

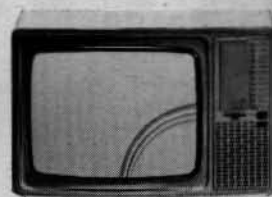


Micro Disc Drive for the BBC Micro

The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5 1/4" disc drive and offers similar features to the larger drive. The data is stored on a 3" disc, this is enclosed in a protective hard plastic cassette which features a write protect switch. The micro drive requires the standard Acorn disc interface, but a new disc filing system rom. Acorn DFS may be exchanged for the micro DFS for £12.00. The new micro disc filing system allows 60 files per disc surface and it can read and write to Acorn DFS discs. Thus if a 5 1/4 inch and a micro floppy were connected on the same cable files could be transferred between them.

Capacity: 80.64 K bytes Transfer Rate: 125kbit/s

TRADE ENQUIRIES WELCOME
Access & Barclaycard Accepted
Large Stocks - 24 Hour Despatch
Carriage 50p to £3.50



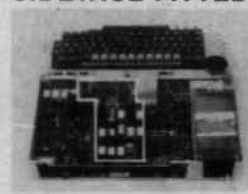
NORDMENDE

14" TV/Monitor £217.00 + VAT

Ref.	Monitors	Ex VAT	Inc VAT
MNB1401	BMC 1401 Colour Monitor	225.00	258.75
MNCE370A	Cable CE 370A Colour RGB Monitor	199.00	228.85
MNKVIS2	Kaga 12" RGB Monitor Vision II (Medium)	285.00	327.75
MNKVIS3	Kaga 12" RGB Monitor Vision III (Hi)	399.00	458.85
MNM1431	Microvitec 1431 14" Colour Monitor (BBC)	215.00	247.25
MNM1441	Microvitec 1441 High Res 14" BBC Monitor	440.00	506.00
MNM1451	Microvitec 1451 Medium Res 14" BBC Monitor	325.00	373.75
MNN1534	Nordmende 14" TV/Monitor	217.00	249.55
MNN3534	Nordmende 14" TV/Monitor with remote control	234.00	269.10
MNN4430	Nordmende 20" Prestige TV/Monitor remote	417.00	479.55
MNN4432	Nordmende 22" Prestige TV/Monitor remote	458.00	526.70
MNN4437	Nordmende 27" Prestige TV/Monitor remote	512.00	588.80

SIDEWISE

SIDEWISE FITTED



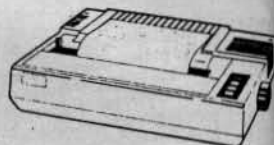
"SIDEWAYS" rom board for BBC Micro.
No soldering required £38.00 + VAT

EPSON

RX-80 £263.12 + VAT

FX-80 £365.09 + VAT

Printer price includes cable for BBC and screen
dump rom is available for £7.50



TORCH COMPUTERS

Perfectly Made in Britain

Ref.	Torch Computers	Ex VAT	Inc VAT
TDZ8DP	Torch Z80 Disc Pack (Dual 800K + Z80)	730.00	839.50
TC301	Torch Work Station (No monitor) (301)	1244.00	1430.60
TC303	Torch Work Station with TOSCA (No monitor)	1449.00	1666.35
TC401	Torch Computer twin 400K (new style)	2250.00	2587.50
TC403	Torch Computer twin 400K & TOSCA (grey)	2455.00	2823.25
TC68000	Torch Computer twin 400K Floppy & 68000	3550.00	4082.50
TC68020	Torch Computer 20Mb Hard Disc & 68000	5900.00	6785.00
TCF500	Torch Computer twin floppies (CF500)	2950.00	3392.50
TCFS500	Torch Computer twin 400K & TOSCA (CH500)	3150.00	3622.50
TCH520	Torch Computer 20Mb Winchester CH520	5650.00	6497.50
TCHS520	Torch Computer 20Mb Hard Disc & TOSCA	5850.00	6727.50
TMC240	Torch Colour Monitor (MC240)	575.00	661.25



Electronequip

36-38 West Street, Fareham, Hants (0329) 230670

Kings Lynn Branch
Tel: 0553 3782



Electronequip

in
Hampshire

Authorised BBC Dealer & Service Centre

DISC DRIVE + INTERFACE

£173.00 + VAT



DISC DRIVE £113.00 (+VAT)

MCD 1 MICRODRIVE from ELECTRONEQUIP

We are pleased to announce that the MCD 1 Micro drive is now a reality, and available Ex-stock from Electronequip.

The Drive is single sided and stores 80K Bytes formatted (100K unformatted). It comes complete in a case, with cables and formatting disc. It incorporates all the Acorn DFS calls and with the ability to address 5.25" and 3" drives (*MICRO and *MINI).

An operating manual will be available, giving a breakdown of all the commands and their use.

The cost of the drive is £129.95 including VAT and the interface can either be bought as a package for £198.95 (for both drive and Interface). Alternatively we will exchange your Acorn DFS for a Micro-DOS EPROM for £13.80 or sell you the Micro-DOS EPROM for £25.00. Diskettes are £4.30 +VAT each.

Reference	Description	Exc VAT	Inc VAT
DDEMD01S	Elect 80K Single Micro Disc Drive	113.00	129.95
DS3M45S	3" MCD 45T Single-sided Disc	4.30	4.95
UGMDISC	Micro Disc Upgrade (I/F and Single Drive)	173.00	198.95
UGMIDOS	Micro DOS/Acorn DFS exchange ROM	12.00	13.80
SPMDISCR	Micro Dos ROM (DFS for Micro Disc)	21.74	25.00

See our price list for full details.



Electronequip



36-38 West Street, Fareham, Hants (0329) 230670



NEMESIS

AN EXCITING NEW BBC MICRO
PROGRAM FROM BRITAIN'S
LEADING SOFTWARE
HOUSE



From the depths of space come
Earth's deadliest adversaries.
Shoot down the convoys of venge-
ful Vogons as they hurtle through
space, bouncing off the debris, to
to ram your shuttlecraft. Keep an
eye out for the Chargers, Crushers and
the cursed Crawler.

Another challenging
machine code game . . .

ONLY
£7.95

The following top titles are available for both the
BBC Micro and Electron: Killer Gorilla £7.95/
Moonraider £7.95/Bandits at 3 o'Clock £6.95/
Croaker £7.95/Felix in the Factory £7.95/
Felix and the Fruit Monsters £7.95/Chess £7.95/
Escape from Moonbase Alpha £7.95/Draw £9.95/
Swoop £7.95/Intergalactic Trader £8.95/
Positron £6.95/Cybertron Mission £7.95.

All prices inclusive of V.A.T.

Mail Order: Please add 55p per order P. & P.

WE GUARANTEE THAT ALL OUR ADVERTISED PROGRAMS
HAVE BEEN COMPLETED AND ARE READILY AVAILABLE.

Showroom:

Northwood House
North Street
LEEDS LS7 2AA
Tel: (0532) 458800

Mail Order:

8/8a Regent Street
LEEDS LS7 4PE
Tel: (0532) 683186
Or: 696343

WRITTEN ANY
PROGRAMS?
WE PAY 20%
ROYALTIES!

SPECIAL
OFFER
Deduct £1 per
cassette when
ordering two or
more.



VISA

WE STOCK THE
BBC MICRO, ELECTRON,
MEMOTECH MTX 500,
COMMODORE 64, ORIC-1
AND SPECTRUM.

B.B.C. MICRO AND
ELECTRON PROGRAMS
CAN BE OBTAINED FROM
SELECTED BRANCHES OF
W.H. SMITH, JOHN MENZIES,
BOOTS, HARRODS, ALL GOOD
DEALERS, OR DIRECT
FROM MICRO POWER.

MICRO POWER

MICROAGE - LONDON'S PREMIER

More an experience than a computer shop.

- A complete range of games, application and business software.

- Friendly assistant to offer help and advice when you request it.



- A library of books that give specific or general information.

The Acorn Expert

If you are thinking of buying a BBC Micro or the amazing new Electron, then come to Microage and benefit from our experience. We have been a dealer practically since Acorn started. In fact we have been selected by Acorn to be the *official* London Distributor. This means we get the latest products in quantity first.

The Amazing Acorn Electron - In Stock Now!

We have stocks of Acorns new Electron and all Acornsoft software. Come and buy one now. £199.

! £ Bargain of the Month £ !

BBC micro with Disk Interface, 800K disk drive, word processing ROM, Epson or Juki printer, Zenith Monitor, dust covers Basic Programming book, leads, paper and cables. Free carriage. Normal price £1,843. Save £244. Our price £1,599.

A Selection from Acornsoft

Snooker, Starship Command, Missile Base, Draughts and Reversi, Acadians all	£9.95
Personal Money Management, Arcade Action	£11.90
View	£59.95
BCPL	£99.95

A Selection from Computer Concepts

Wordwise, Beebcalc	£39.95
Disk Doctor	£33.00
Termi price on application	
Chess, Android Attack, Swarm all	£8.95

Some of our books

Easy Programming for BBC	£5.95
Basic Programming on the BBC micro	£5.95
Assembly Language	£8.95
Programming for BBC	£6.95
Discovering BBC	
Machine Code	£7.50
Creative Graphics, Graphs and Charts, LISP and FORTH all at	£5.95
30 hour BASIC	£5.95
BBC Micro Expert Guide	

BBC Machines

Model A, 32K RAM and 6522	£329
Model B	£399
Model B + Disk interface	£494
BBC dust cover	£3.95

Disk Drives

BBC compatible single disk drive (100K)	£235
BBC compatible dual disk drive (200K)	£389
BBC compatible single slimline (400K)	£399
Verbatim single sided diskettes 10 for	£22.50
Verbatim double sided diskettes 10 for	£39.95

Monitors

14" RGB Microvitec Colour Monitor inc. lead. (As used in BBC Computer prog.) Price dramatically reduced to	£245
Microvitec medium res. colour monitor. Price cut to	£369
12" Zenith High res. green screen monitor.	
The new model at	£95
BNC Cable	£4.95

HOME COMPUTER DEALER

If you are interested in joining the home computer revolution or adding to your present system, then come along to Microage. In a relaxed atmosphere you can browse through the best selection of computer products and peripherals in London. Helpful assistants who really know about the products offer unbiased advice to help you choose a personal computer or get the best out of your own.



• **The Microage Space Station, you're always in command. Sit at the controls and you'll see everything laid out neatly before you.**

There's room for your printer, monitor, keyboard, cassette recorder and disk drives – and a handy draw for programs and manuals.

The Microage Space Station takes off for just £49.95



• **A complete range of personal computers.**



• **Business computers too!**

Computer Users Data File

If you can't make it to the shop you don't have to miss out on our prices and services. Just write for our Computer Users Data File. 24 fact-packed pages of current stock and prices.



Printers

Seikosha AP – 80A now	£189
Seikosha AP – 100A now	£215
Epson FX – 80	£430
Epson MX – 100	£460
Juki 6100 Daisywheel	£430
All printers include paper and cable.	
Printer Cable	£13
10" listing paper, 2000 sheets	£16.50

Miscellany

RH Electronics colour light pen	£39.95
BBC Compatible Cassette Player	£29.95
DIN to Jack Lead	£2
APTL ROM Board	£43.70
Official joystick per pair	£13
10 Blank C12 tapes	£3.95

Microage Discount Card

Why not ask for our discount card guaranteeing you 5% discount off everything after your first purchase. All items subject to availability.

Institutional and Educational

Microage offer very competitive rates and quotations for quantity orders on all equipment including Econet networks. We have four years experience of supplying and servicing Acorn equipment in schools, polytechnics and universities.

POSTAGE RATES

Small items such as Ribbon, books and software:– 1 item £1.00, 2 items or more 50p per unit.

BY COURIER TO YOUR DOOR

Large items such as Computer Disk Drives and Monitors:– 1 item £7, 2 items £10, 3 or more £13.

Barclaycard and Access welcomed.

All prices include VAT.

MICROAGE ELECTRONICS

135 HALE LANE EDGWARE MIDDLESEX HA8 9QP

TEL: 01 959 7119 TELEX 881 3241

All
games for
the BBC Micro
32K

MRM SOFTWARE

Also
available on
Micronet
800

Games for the Adventurous

Secret Sam I

You are Secret Sam. A top secret agent engaged upon a highly dangerous and confidential mission. In this intriguing adventure world of spies, counter-spies, double-dealers and espionage you must act swiftly but cautiously whilst searching for clues. Can you trust the agents that you meet? Have you all that's necessary to successfully accomplish your deadly assignment?

Secret Sam II

Following the success of his last mission – Sam is off once more on his journey into intrigue – tread carefully though for if you thought SAM I was dangerous your in for a shock! This really is an adventure game for the adventurous – be careful and mind how you go. Are the 'phone kiosks for changing into Superman? We're not saying but what we will say is "have the aspirins ready because this will certainly cause some headaches".

Q-MAN



The very popular 3D pyramid game. Hop around the pyramid avoiding the bouncing balls and Jake the Snake. A highly entertaining game with increasing difficulty plus our own totally unique features. Game includes TRANSPORT DISCS, BONUS, HIGH-SCORE TABLE, HYPERSPACE and SMART BOMBS. Excellent graphics and terrific sound. One of the three top selling games on MICRONET this month.

No 1 on Micronet

Q-MAN'S BROTHER



Q-MAN'S BROTHER is featured in the high score table of Q-MAN and now has his very own game. Have you time to paint all of the maze? Not if the PAINT POTS have anything to do with it or especially the deadly PAINT ROLLER which will erase all of your hard work! Increasing difficulty, excellent sound, AMAZING 3D graphics and high score.

No 5 on Micronet

BANANA MAN



A totally new concept from MRM. You are the BANANA MAN and you must eat 40 BANANA SANDWICHES each minute to stay alive. There are BLUE BLOCKS which may prevent you from reaching the food and deadly PURPLE TARANTULAS that are fatal if stepped upon. ETHEL the CAT also appears but can be scared away for mystery points. But watch out, she conceals a spider. Features include BONUS BANANAS, BLOCK 'SHUFFLE', INCREASING DIFFICULTY, HIGH-SCORE TABLE and GREAT GRAPHICS.

GUY IN THE HAT



You are THE GUY IN THE HAT entombed in a honeycomb labyrinth. Like BANANA MAN you have an increasing daily food diet, but this time your favourite snack is a BICKIE. Beware of the pursuing BICKIE BASHERS that are trying to ensnare you. Gain extra points by dropping your exploding hat and trapping the BICKIE BASHERS. Movement in 6 directions, HYPERLEAP and menacing sounds are included along with the usual great graphics and high-score table.

DIAMOND MINE



An absolutely fascinating and compulsive game designed to test your skills of dexterity and coordination. Steer the lengthening pipe to the diamonds buried deep in the depth of the diamond mine. But be careful avoid hitting the walls with the pipe and watch out for those monstrous menacing meemies ... the bugs. Have you enough pipe left to collect all the diamonds? Have you got steady hands? Find out with this sparkling gem from MRM.

3D MUNCHY



A visually stunning version of the now legendary arcade classic ... with a difference. Eat power pellets whilst avoiding the GHOSTS as usual, but can you get past the HOLES? Absolutely amazing graphics and sounds, increasing difficulty and high score. All this and you're battling against the clock as well. A CLASSIC from MRM.

No 8 on Micronet

EACH GAME ONLY £5.70
ENCLOSE 55p P&P PER ORDER



MRM SOFTWARE
17 Cross Coates Road
GRIMSBY
South Humberside
Telephone: 0472 44304

Dealers
telephone
now for
dealer prices

ARE YOU SERIOUS?

STOP PRESS – REPLICA II NOW AVAILABLE (now compatible with Acorn, Pace and Watford DFS)

In addition to the features below it also works with "locked" programs plus very long programs (HEX & E00 to 7B00)

available at
larger BOOTS

ALL SOFTWARE NOW ON 3" DISC AVAILABLE

Ring to check
compatibility if you
are NOT using
Watford, Acorn or
Amcom DFS.
Hotline 0606
48511

THE KEY

THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

- 1) FORM40 – now much faster.
- 2) FORM80 – now much faster.
- 3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
- 4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
- 5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY £12.95

(state 40 or 80 track)

available at
larger BOOTS

GRAFKEY/GRAFDISK

The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

GRAFKEY (joystick & keyboard) **£9.00**
GRAFDISK (state 40 or 80 track) **£12.95**

SHADOW

A tape cloning program that will enable you to make security back ups of your valuable cassette based software.

SHADOW works with 99% of all known programs including those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.

SHADOW is the definitive tape backup system. Also on the same tape is a very useful program called "INSPECTOR" which allows the user to page through memory, search for a string, etc.

BOTH PROGRAMS £8 incl.

(This program for personal use only).

JOYSTICK UTILITY

Converts non-joystick programs to work with joysticks. Works with any program using INKEY(-), which applies to most programs. Easy to use, just press the keys you want to transfer. Supplied on cassette but can be transferred to disc.

CASSETTE **£6.00**

available at
larger BOOTS

SINGLE KEY ENTRY

Requires 1.2 O.S.

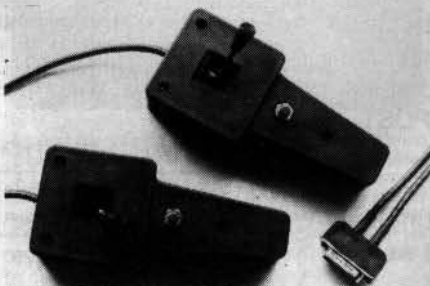
A very useful utility that provides single key input of 66 key words. Just like having 66 function keys. Compatible with issue 1 & 2 basic and discs.

CASSETTE **£5** inclusive

JOYSTICKS

Pair of fully proportional joysticks of compact and handy size

£17.95



EDUCATIONAL CORNER

(for the 5-11 age group)

THE GARDEN – 3 programs with superb graphics. Covers: colours, spelling and understanding. Cassette **£8.00**

COUNTING – robots, rockets, flowers, etc. Excellent graphics, good range. Cassette **£6.00**

MATCHING – 4 programs covering numbers, words, shapes and patterns. Cassette **£7.00**

HUE-MEN – A superb teaching-aid, using animation techniques in Mode 7. A hit with adults and children alike. Cassette **£6.00**

And now **SHAPE MEN** using the same techniques. This is the second in an integrated approach to teaching. **£6.00**

INTRO – A simple programming language which uses the immediate visual response of "Turtle" graphics to introduce a number of programming concepts and techniques. Cassette (and 9 page manual) **£10.00**

PROGRAMMERS

We are constantly seeking new and interesting programs. Why not send yours for appraisal? You have got nothing to lose but much to gain – So why not send your program today? 40 track disc if possible or two copies on cassette. In some cases we will even provide disc drives against future royalties.

CLARES MICRO SUPPLIES



Dept. BMU3,
98 Middlewich Road,
Northwich,
Cheshire, CW9 7DS.
Tel: 0606 48511

All prices inclusive of
VAT + Carriage – No Extras.

KEENEST PRICES ★ PROMPT RELIABLE SERVICE ★ that's Twillstar!

BBC MICROCOMPUTER

Model B	£399.00
Model B & Disk Interface	£469.00
Model B & Econet	£446.00
Model B & Econet & Disk Interface	£516.00
Teletext Receiver	£225.00
Official BBC Data Recorder	£29.95
Official Joysticks	£13.00

BBC UPGRADES

1.2 O/S	£11.50
Basic 11	£32.00
Disk Interface Kit	£97.00

ECONET ACCESSORIES

Econet Interface	£70.00
Clock Box (Inc. PSU)	£45.00
Terminator Box (Inc. PSU)	£35.00
Printer Server Rom	£49.00
File Server Level 1	£99.00
File Server Level 2	£249.00
10 Station Lead Set	£29.00
100M Econet Cable	£99.00
Econet System User Guide	£10.00

DOT MATRIX PRINTERS SHINWA CP80

FREE CABLE AND PAPER WITH ALL PRINTERS

80 column, friction and adjustable tractor feed, bi-directional logic seeking HI-RES graphics and block graphics sub and super scripts, condensed and emphasised print, and underlining vertical and horizontal tabs, self test, italic print, etc.

Shinwa CP80 F/T £230

MANNESMANN MT80

High quality 80 column serial dot matrix printer. Dual density dot addressable graphics, quick tear facility as standard, optional sound reduction kit to give an impressive L55dBa acoustic noise rating. Ability to handle both tractor-fed fanfold and single paper.

Special price of £249

EPSON

Epson FX80 F/T	£395
Epson RX80 F/T	£305
Epson FX100 F/T	£499

NEW! RITEMAN MATRIX PRINTER

SLEEK DESIGN
EXCELLENT
FEATURES,
SUPERB PRINT QUALITY

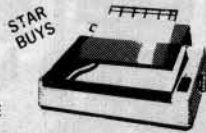
80 COLUMN · FRICTION AND PIN FEED · 120 CPS BI-DIRECTIONAL · HI-RES AND BLOCK GRAPHICS · 9 x 9 MATRIX TRUE DESCENDERS · NORMAL, EXPANDED, CONDENSED PRINTING · EMPHASISED AND DOUBLE STRIKE PRINTING · ITALICS PRINTING · AUTO UNDERLINING · SUBSCRIPT AND SUPERSUBSCRIPTS · INTERNATIONAL CHARACTER SETS · EASY ACCESS DIPSWITCHES · 1:1 HIGH RES (TRUE CIRCLES AND SQUARES) · OPTIONAL TRACTOR UNIT · OPTIONAL RS232C INTERFACE

£230

NEW!

THE ULTIMATE MATRIX PRINTER AT UNBEATABLE PRICE

TRUE 160 CPS, 80 COLUMN UHR PRINTER WITH 100% DUTY CYCLE AND UNBELIEVABLE FEATURES



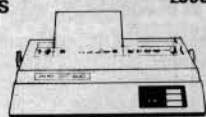
160CPS BI-DIRECTIONAL LOGIC SEEKING · STANDARD SPOOL RIBBON · UP TO 136 COLUMNS · 5, 6, 8, 10, 12 and 17 CHARACTERS PER INCH · DOWNLOADABLE CHARACTER SETS (UP TO 384 CHARACTERS AVAILABLE) · MACRO INSTRUCTION SET · PARALLEL AND SERIAL INTERFACE STANDARD · STANDARD WITH 8K BUFFER · 240 CPS WHITE SPACE SPEED · EMPHASISED AND DOUBLE STRIKE · SUPER AND SUBSCRIPTS · COLUMN SCAN BIT IMAGE GRAPHICS · ITALICS · FRICTION, TRACTOR AND ROLL HOLDER AS STANDARD

DAISYWHEELS

£395

JUKI 6100

20 CPS max (13 CPS Shannon text) 10, 12, 16 CPI and proportional spacing up to 220 characters per line, diablo protocols. Bold, shadow printing and underlining. 2K Buffer Standard £395



BROTHER HR15

13 CPS. 10, 12, 15 CPI and proportional spacing up to 165 characters per line, colour printing, shadow printing, super/sub script, auto underlining, text reprinting. 3K Buffer Standard Brother HR15 £395 Keyboard £160 Sheet Feeder £228 Tractor Unit £109



MONITORS

PHILIPS TP200 Green Monitor

You can use this latest Philips Green Monitor for personal computers, business computers, control systems, automatic test equipment. The picture quality of the TP200 means not only 80 x 24 lines of information but also usage for high resolution graphics.



AT THE BARGAIN PRICE OF £79

NOW AVAILABLE

BBC Official 12" GREEN MONITOR RECOMMENDED BY DTI FOR SCHOOLS, EDUCATION AUTHORITIES & INDUSTRY. SPECIAL CASING, HIGH RESOLUTION.

14" TV/MONITOR

NORDMENG



This TV Monitor is not a modified television as many TV Monitors are, but a 14" TV/Monitor which has been designed to perform both functions. It has RGB and Composites video and sound. An RGB cable for a BBC is supplied as standard.

With Remote Control £269

MICROVITEC 14" Colour Monitors

Microvitec 1431 14" Std. Res.	£245
Med. Res.	£395
Hi-Res.	£495

★ STAR BARGAIN!



WORD PROCESSING PACKAGE

BBC Model B plus Disc/Interface fitted view, V.D.U. Green Monitor. Daisywheel Printer. 200K Dual Disk Drives and manual and formatting disk. ONLY £1,329 (incl. all cables)

TCL DRIVES AT

LOW PRICES! SLIM DISK DRIVES

TEAC 55A S/S 40 TRACK	
100K Single	£165
200K Dual	£330
TEAC 55E S/S 80 TRACK	
200K Single	£199
400K Dual	£398
TEAC 55F D/S 80 Track	
400K Single	£255
800K Dual	£510
Power Supply Unit (Optional)	£29
40/80 Switch	£8
MITSUBISHI DRIVES	
400K D/S DD Single	£245
Dual	£435

ROM EXPANDER

Double your sideways Rom sockets, with the TCL Rom expander. Simple to install and very easy to use! Manufactured using components of the highest quality! Extremely reliable! £18.95

WORD PROCESSORS

View Word Processor	£59
Word Wise Processor	£39

UTILITY SOFTWARE

Screen Dump Rom	£17.25
-----------------------	--------

For EPSON, SHINWA, NEC, STAR

NEW TCL MICROGUIDES

The KEYPLATES to make it easy! Microguide KEYPLATES fit neatly over your computer keys - Gives you an easy to read list of commands - Alphabetically arranged for immediate access - Placed exactly where you require it as part of your computer keyboard - The Keyplates, made of durable plastic, have space for function key notes - Clean-wipe pen for function key identity is supplied - + FREE ERROR MESSAGE BOOK. ALL FOR ONLY £5.95

SURE SHOT

BBC Compatible KLIK STIK JOYSTICK - SELF CENTRING Two Fire Buttons Single - £17.95 Dual - £34



CABLES - Drive Cables

Single	£9.50
Dual	£13.50
BBC Printer Parallel	£13.50
Serial	£25
BBC Cassette Leads	£3

FLOPPY DISKS

Floppy Disks in packs of 10	
Single sided 40 Track	£20
Double sided 80 Track	£35

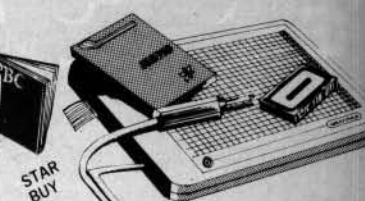
TCL VINYL DUS COVERS

BBC	£3.50
Printer	£5.50
Monitor	£4.50



NOW AVAILABLE THE ACORN ELECTRON ONLY £199

★ 24hr DELIVERY ON ALL ITEMS ★ (subject to availability.)



GRAFPAD

£143.75

Add new dimensions to your computer enjoyment. Create your own designs. Complete with Utility programmes. Amazing value. Complete unit - simply plug in -

BOOKS BBC

Micro's for Beginner's	£6.95
Advanced Prog Tech	£7.95
ALP on BBC (A.W.)	£7.95
Ass Lang for BBC (Shiva)	£7.95
ALP (Macmillan)	£8.95
Basic (Arnold)	£5.95
Basic (Mel-House)	£6.95
Basic Progs for BBC	£5.95
Easy Progs for Your BBC	£5.95
Expert Guide	£6.95
Functional Forth	£5.95
Further Progs	£5.95
Games BBC Computers Play	£6.95
Games for Your BBC	£2.95
Graphics & Sound (Granada)	£6.95
In Education	£6.50
Introducing the BBC Micro	£5.95
Let Your BBC Teach You	£6.95
Advanced User Guide	£12.95
Micro Revealed	£7.95
Programming the BBC	£6.50
Putting Your BBC to Work	£4.95
Structured Programming	£6.50
Using Floppy Disks	£9.95
21 Games for BBC	£5.95
30 Hour Basic	£5.95
30 + Progs	£4.95
35 Educational Progs	£6.95
36 Challenging Games for BBC	£5.95
Hobbit BBC (cassette)	£14.95
Hobbit BBC (book)	£5.95
Brainteasers for BBC	£5.95
Best of PCW Software BBC	£5.95
Graphics on the BBC	£6.95
Disk Companion	£6.95

★ SERVICE CONTRACTS TO EDUCATION AUTHORITIES AT DISCOUNT

★ OFFICIAL ORDERS FROM DEALERS, GOVERNMENT DEPARTMENTS, COLLEGES AND SCHOOLS WELCOME

★ ALL PRICES INCLUSIVE OF VAT

HOW TO ORDER

You may purchase any of the items listed by cheque made payable to: TWILLSTAR COMPUTERS LTD., Barclaycard or Access. All you have to do is fill your requirements on a separate sheet of paper. Post to us and we will dispatch within 24 hours subject to availability. All prices inclusive of 15% VAT. ADD £2.50 P&P for orders below £150, OVER, ADD, £8 P&P.

TELEPHONE ORDERS

(01) 574 5271

CREDIT CARD HOLDERS MAY ORDER BY TELEPHONE. GIVE CARD NO NAME, ADDRESS & ITEMS REQUIRED.

Twillstar Computers Limited

17 REGINA ROAD · SOUTHALL MIDDLESEX · TEL: (01) 574 5271 (OPEN SIX DAYS A WEEK - 10 a.m. to 8 p.m.)



GSL

A **GSL** COMPUTING PUBLICATION

COMPUTING NEWS

MARCH
1984

ISSUE 5



The New Streamlined Winchester System

WINCHESTER SETTING THE STANDARDS IN EDUCATION

E-NET a flexible network system for the BBC microcomputer is now being installed within Education. "Doctor Challiners Grammar School" in Amersham are now operating a twelve station networking system using a 10 Megabyte Winchester Hard Disc unit.

E-NET allows up to 200 computers to share a common, large central disc store, and overcomes many of the inconvenient features of earlier network systems.

E-NET uses a hard disc unit as the central disc store, allowing upwards of 8 Megabytes of storage. It has effective, simple structures to limit the disc space available to any user, and to permit access by any user to library programs. Many users of the few simple networks installed so far have complained of the difficulty of monitoring pupil's use of disc space, but E-NET overcomes all these problems by doing the monitoring for you. You simply allocate a space limit to each user on the Hard Disc using the simple command program. For most schools and colleges this size disc will allow each user to have a reasonable file store, but it can be extended if required by adding further hard disc

units. Important files can be easily copied to minifloppies if required.

E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

E-NET allows one or more printers to be connected to the network and although this is connected to one of the network computers this computer can still be used even while the printer is in use.

E-NET is fast, simple to use and versatile. The first system being installed for use in September, and demonstrations can be arranged.

EDUCATION APPROVED DISC DRIVES MATCHING ACORN BBC MICRO

All disc drives supplied in metal case finished to match the Acorn BBC microcomputer.

Shugart SA200 Capacity 100K — Price £149.95 including Leads.

Less than two-thirds the height of standard models, Shugart's single-sided SA200 5.25 inch minifloppy disc drive offers 125 or 250 Kbytes of capacity in a low cost highly reliable package. Low cost, compact size and high reliability make the SA200 an ideal choice for entry level desk top applications in personal computers, word processors, memory typewriters, portable computers or terminal add

	Price £
5 MB Winchester System	1650.00
10 MB Winchester System	1950.00
20 MB Winchester System	2400.00
65 MB Winchester System	4700.00
105 MB Winchester System	5130.00
140 MB Winchester System	7000.00
280 MB Winchester System	9500.00



The complete system is compact and easy to use.

ons. Package includes all interconnecting leads.

Shugart SA455 Capacity 200K — Price £238.00 including Leads.

Shugart SA465 Capacity 400K — Price £281.50 including Leads. Prices excluding carriage and VAT.

Shugart's SA455/465 half height mini floppy disc drive offer a compact alternative to standard height drives for desk top systems requiring maximum performance in a greatly reduced space. Since users can quickly double existing storage capacity by fitting two drives in the space formerly occupied by one standard minifloppy the SA455/465 drives provided and excellent means to increase storage capacity without increasing space.

NORTHERN SOLE DISTRIBUTOR APPOINTED

Due to increasing demand for GSL Winchester System, GSL Computing Limited has appointed a distributor to cover the North U.K. Market.

The appointed Sole Distributor for the North U.K. Market is: Pace Software Supplies Ltd., 92, New Cross Street, West Bowling, Bradford BD5 8BS. Telephone (0274) 729306.

Read the next ISSUE of this magazine for further developments and information of the "GSL WINCHESTER SYSTEM" and newly appointed dealers.

Showroom facility at GSL enlarged

Peripherals always available

GSL has an extensive showroom displaying all their advertised products and more. Customers are encouraged to use the equipment on show and helpful advice and personal demonstrations are readily available.

GSL know from talking to their customers that nothing is more frustrating than responding to an advertisement and finding the advertised goods are out of stock or not readily available. GSL hold large stocks of all computer peripherals advertised.

The GSL range is constantly growing and currently includes:

- BBC MICROCOMPUTER
- SHUGART DISC DRIVE RANGE
- NEC PRINTERS
- EPSON PRINTERS
- PRINTER BUFFER
- MICROVITEC COLOUR MONITORS
- SANYO COLOUR MONITORS
- GREEN SCREEN MONITORS
- TORCH 280
- VARIOUS SOFTWARE INCL. WORDWISE
- PRINTER PAPER

GSL Analogue Signal Display & Analysis System

This system enables a BBC Microcomputer (Model B) to function as a two channel, large screen, storage oscilloscope, for frequencies up to high audio values.

The basic system comprises an analogue to digital interface unit which is connected to the computer via the 1MHz bus. The accompanying software package enables input signals to be displayed in the time domain and also, if required, analysed via fourier transformation to give frequency domain representation.

The main features of the system are:

1. Two channel, large screen, display of signal amplitude vs time, with grid scaling information, channel identification and pk/pk measurement.
2. Repetitive or externally triggered sampling of input signals.

3. Display time (total sampling period) variable from 0.002 sec. to 25 secs.

4. Number of sample values = 100 per channel.

5. Minimum sampling time = 20 sec. (inclusive of both channels).

6. Software controlled triggering delay available.

7. Option to list individual sample values.

8. Either the following or preceding 'screen' of data is stored for each sampling period (the latter, only in triggered mode), and this may be displayed when required.

9. Fourier analysis of the data for either channel may be performed, and the frequency domain, representation plotted (50 values).

10. Up to 5 frequency domain plots may be stored internally and recalled for comparison with the current plot.

11. Full screens of information may be 'dumped' to a printer (NEC PC-8023B-C Dot Matrix Printer), for both the amplitude vs time and amplitude vs frequency displays.

The programme is loaded from tape using the command CHAIN "scope".

Price £350.00 Excluding carriage + VAT.

We are an official Acorn Dealer and Service Centre
Dealer Enquiries Welcome

Return to GSL COMPUTING LTD,
I am interested in the following:
(please tick)

The GSL Winchester System

5 MB

10 MB

20 up to 200 MB

The GSL Slim Line Disc Drives

Your full range of Micro Computers and computer peripherals

GSL Analogue Signal Display and Analysis System

GSL Printer Buffer

2 North Way, Andover, Hampshire SP10 5AZ

Name: _____

Position: _____

Company: _____

Address: _____

Phone: _____

☐ Send me by return full technical information

or phone Rod Lewis on Andover (0264) 58744/51699

M.U.

GSL **GSL COMPUTING** 2 North Way, Andover, Hampshire
SP10 5AZ Telephone: 0264 58744 Telex: 47166

A SUPERB NEW PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE!

CYBERTRON MISSION

Fort Cybertron: the most well-protected stronghold in the galaxy. Obliterate the Spinners, Clones and Cyber-Droids as you run from room to room in search of the Fort's riches. Avoid touching the walls with their sizzling high voltage charge. Watch out for the relentless Spook who glides through walls in hot pursuit.

Superb graphical animation and nerve-wrecking sound effects feature in this new machine-code game. **£7.95**

*VERSIONS AVAILABLE FOR BBC AND ELECTRON



WE STOCK THE BBC MICRO, ELECTRON, DRAGON 32, COMMODORE 64, ORIC AND SPECTRUM.

SPECIAL OFFER

Deduct £1 per cassette when ordering two or more

All cassettes are fully guaranteed and contain two recordings. All prices inclusive of VAT.

Mail Order: Please add 55p per order to cover P & P.

WE'RE EXPANDING!

Showroom:
Northwood House
North Street
Sheepscar
Leeds LS7 2AA
Tel: (0532) 458800

Mail order:
Dept.BMU2
8/8a Regent Street
Chapel Allerton
Leeds LS7 4PE
Tel: (0532) 683186/696343

WRITTEN ANY PROGRAMS? WE PAY 20% ROYALTIES



WE Guarantee THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

The following titles are available for both the BBC Micro and Electron: Killer Gorilla £7.95/ Moonraider £7.95/Bandits at 3 o'Clock £6.95/ Croaker £7.95/Felix in the Factory £7.95/ Felix and the Fruit Monsters £7.95/Chees £7.95/ Escape from Moonbase Alpha £7.95/Draw £9.95/ Swoop £7.95. BBC only (at present): Martian Attack £7.95/Demon Decorator £6.95/ Asteroid Storm £7.95/Laser Command £7.95/ Galactic Commander £7.95/Time Trek £7.95/ Danger! UXB £7.95/Cowboy Shootout £6.95/Wall £5.95/ Alien Swirl £6.95/Labyrinths of LaCoshe £7.95/ Adventure £7.95/Caveman Adventure £6.95/ Filer £9.95/Beebmon £7.95/Barrage £7.95/ Chemistry £6.95/World Geography £6.95/ Where? £6.95/Junior Maths Pack £6.95/ Constellation £6.95/Physics £6.95.

BBC MICRO AND ELECTRON PROGRAMS CAN BE OBTAINED FROM SELECTED BRANCHES OF W. H. SMITH, JOHN MENZIES, BOOTS, HARRODS, ALL GOOD MICRO DEALERS, OR DIRECT FROM POWER.

Turtle Graphics

Native Code
Generators

Cross
Assemblers

Z-80

8088

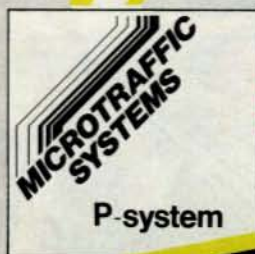
FORTRAN 77

UCSD PASCAL

UCSD BASIC

68000

6502



LET'S STOP PLAYING GAMES

The BBC micro is a great computer if you want to play games and learn about computing.

However, if the time has come for you to stop playing games and get on with the real business of producing professional programmes for the microcomputer market, you need the UCSD p-system from Microtraffic Systems.

Program Development environments.

The UCSD p-system is the fastest growing software development system for microcomputers. Microcomputer manufacturers, software houses and more than 50,000 end users have already made the p-system their choice. And more are doing so every day. This is because:

- p-system users can write program modules in Pascal Fortran, Basic and Assembler and integrate them into a single application program.

- p-system application programs can run on the widest range of microprocessors viz:- Z80, 8080/8085, 8088, 6502, 6809, 9900, 68000, PDP-11 and LSI-11.
- the p-system is the friendliest and most powerful professional program development environment available for microcomputers today. With program chaining and dynamic overlays the largest applications programs will run on the smallest machines. With single keystroke commands and a continuous display of available options, the operating system, editor, filer and other utilities are simple, yet sophisticated programs to use.

**Ring Microtraffic today
& we'll tell you the
whole story.**

**MICROTRAFFIC SYSTEMS LTD.,
MELBOURN SCIENCE PARK
MOAT LANE, MELBOURN,
ROYSTON, HERTS SG8 6EJ.
TEL: ROYSTON (0763) 62221
TELEX: 817932 CAMTECH G**



**MICROTRAFFIC
SYSTEMS**

CONSIDERABLE improvements have been made to the BBC's Telesoftware service, launched last September to provide free software over the airwaves.

Previously there were

problems in downloading some Basic programs, but now a software patch broadcast over the telesoftware system allows any BBC Basic program to be downloaded onto a BBC Micro.

Not content with this, they have also provided patches which allow programs which make use of tokenised Basic to be broadcast, allowing more efficient use of the micro's memory.

Finally, a method has been developed which allows the broadcasting of machine code programs, considerably broadening the range of software that can be broadcast.

Given this increase in the scope of the programs it can offer and the rumours that the BBC is going to provide proper funding from its software profits, the future looks set fair for the service.

Tube problems solved

PROBLEMS with the Tube have been delaying the second processor add-ons for the BBC Micro, Acorn chief Chris Curry revealed in a speech at the opening of the Acorn Information Centre in Brussels.

But he claimed the difficulties were now over and promised that the Z80 second processor would be available in the spring, followed by the NS16032 in the summer.

During his visit to Belgium he also released prices for the Advanced Business Machine, due to be launched this summer.

Featuring an on-board Z80 and NS16032 second processor, prices will range from £1,500 to £3,000.

Chris Curry also disclosed that Acorn plan to market two or three of the more popular BBC Micro games on serial ROMs.

These plug into the "ashtray" on the micro, allowing instant loading of games.

Acorn smashes US sales target

THE BBC Micro is taking the United States market by storm with more than \$50 million worth of business being booked there in less than six months of trading.

This means Acorn in the States has already beaten its target figure for the first year by \$10 million — with six months still to go.

"We are progressing very favourably", Harvey Lawner, Acorn's general manager in America told *The Micro User* from his headquarters in Woburn, Mass.

"In fact, we have done far better than we believed possible in the fiercely competitive education market here" he said.

The company demon-

strated its capability of showing a clean pair of heels to its rivals when it won its largest single order recently.

It beat both Apple and Atari in a public bid to provide 170 machines for a secondary school in Phoenix, Arizona.

And to cope with the ever increasing demand for the BBC Micro in the USA, a shipment of 1,000 machines was despatched from the UK last month.

Acorn got off to a flying start State-side by booking 8 million dollars

worth of business even before its official American campaign was launched last September.

This was achieved despite jibes from United States experts that the British company would end up with egg on its corporate face.

One of the prophets of doom, Clive Smith of Boston's Yankee Group, a leading market research concern, was moved to say: "I'm not sure why they've targeted the education market here. It seems a shortcut to disaster".

Additionally some US analysts went on record as saying the BBC Micro was overpriced.

But Acorn has proved

them all wrong. So why has the machine been so successful to date?

"One of the reasons is because of our track record back in the UK", says Harvey Lawner. "Americans are still aware of the quality of education to be found in Britain.

"So when we tell them that 80 per cent of all computers in British schools are Acorns, they take notice. It's an excellent selling point".

This has been reinforced by the fact that in America, Acorn is offering up to 200 "schoolware packages", each including its own lesson plan.

"What we are able to give them are total solutions the like of which they have never seen before", claims Harvey Lawner.

**THE COMPUTER
THAT WAS CREATED
IN A SCHOOL.
NOT A FACTORY.**



Adverts like this are spearheading Acorn's American sales drive

ACORN COMPUTER

Fibre optics network

SYMBIOTIC Computer Systems has announced the first "Symbnet" local area network for the BBC Micro using fibre optics.

Stations up to 9km apart can be interconnected without electrical noise problems, claims Symbiotic, and the modular design allows the user to add stations wherever required.

Five shows will be major draw

A SERIES of five shows devoted to the BBC Micro and the Electron are expected to attract more than a quarter of a million people this year.

Four of the shows are scheduled for London and one for Manchester.

Each will be held under the banner of "The Electron and BBC Micro User Show" and all five events are being sponsored jointly by *The Micro User* and its new sister publication, *Electron User*.

The London shows are to take place from March

29 to April 1 at the Westminster Exhibition Centre; July 19 to 22 at Alexandra Palace; October 25 to 28, also at Alexandra Palace; and from December 6 to 9, again at the Westminster Exhibition Centre.

Ambitious

UMIST in Manchester is to host the single show outside the capital from August 31 to September 2.

"We are well aware that this is the most ambitious project ever to

be undertaken by the organisers of computer shows", says Derek Meakin, joint managing director of Database Publications.

"But let us not forget we exist in a rapidly changing market. As a result, we will be able to unveil a batch of new and exciting products at each of the shows."

"The London shows in particular are to be held at around three month intervals — which is a long time in the computer marketplace".



More micro aid for handicapped

A WEST Midlands man who pioneered the use of "talking" BBC Micros for the blind is now looking at the problems of the mentally handicapped.

Bob Hinds, of Shrewsbury, who has appeared on Pebble Mill with his Dalek-voiced Beeb, is nearly blind himself.

He is two thirds of the way through an Open University computer science degree, and the BBC Micro helps him with his studies by telling him what is on the screen.

Now he wants to adapt one to help mentally handicapped children.

Last month Mr Hinds visited local sheltered accommodation for the mentally handicapped, where he demonstrated his equipment. "The effect

was startling", he told *Micro User*.

Totally withdrawn patients with no speech ability responded to on-screen colour patterns and to the sound of their names on the speech synthesiser.

Some of them pressed the keys again and again to hear the machine say their names.

Soon Mr Hinds is to meet parents of the handicapped children, along with hospital administrators, to discuss setting up a scheme for unlocking the hidden potential he believes the children possess.

He hopes to get the go-ahead this summer for a full-blown scheme, possibly with official funding. Failing that, he hopes for donations.

Transfer program problem

THE recent controversy over software protection took a new turn with the temporary withdrawal of Clare's cassette-to-disc transfer program Replica.

Was this due to a previously undiscovered bug? Dave Clare said firmly: "Definitely not".

Declining to elaborate, Dave refused to comment on reports that a warning shot had been fired across his bow by one of the largest producers of software for the BBC Micro.

"However", he continued, "we are glad to announce that Replica is now back on sale and we have great plans for the future".

In the meantime, Acornsoft have released further details of their cassette-to-disc exchange service for Acornsoft products. In exchange for the cassette, Acornsoft will supply a disc version of the same title at 50 per cent discount.

Customers should return the cassette (without the outer box), together with the money, to:

Disc Replacement Service, Acornsoft Ltd., c/o Vector Marketing, Dennington Industrial Estate, Wellingborough, Northants NN8 2RL.

More micro

THE BBC celebrated the second birthday of its Computer Literacy project recently by publishing a book on its history and announcing three new micro oriented television series for 1984.

The booklet, "Towards Computer Literacy", gives a brief but thorough history of the project from its humble beginnings to the money spinning giant it has now become.

Aubrey Singer, managing director of BBC Television, described the project as "a story of success in high endeavour".

He felt that the project had resulted in the fact that "people have stopped being afraid of computers. Computer anxiety has become computer

enthusiasm."

Evidence of this is shown by the three programmes planned for BBC television this year.

The first, "Computers in Control", is a series of five programmes giving an introduction to robotics, monitoring and control applications using the microcomputer.

Practical

In addition the National Extension College is producing a practical course on control for BBC Micro owners and the BBC Buggy will be available in kit form. The programme starts on BBC-2 on March 2, with two BBC-1 repeats during the week.

April 12 sees the start of the "Electronic Office",

Keith Waterhouse

THE more astute among our readers might have noticed that the eminent journalist, Keith Waterhouse, has "joined" the staff of *Micro user* writers.

The article "Impious Thought for the Day" was, with only minor adaptations, Mr Waterhouse's own work.

When it was submitted

— not by the author — we published it in good faith, and now apologise without reservation for having used it without permission or due credit.

Those of you who found Mr Waterhouse's style appealing will be interested to know that his latest book, "Mrs Pooter's Diary", is currently available.

GAMES ON THE BOX

FOR the first time games for the BBC and Electron are being advertised on TV, with Ocean Software promoting Mr Wimpy (BBC Micro), Hunchback (Electron) and Chinese Juggler (both machines).



It's the cat's whiskers for Gemma

THE BBC Micro is kid's stuff for baby Gemma Smith at her home in Grimsby.

For ever since her industrial chemist father Dennis devised a program depicting a cat, he hasn't been able to drag her away from the keyboard.

And that's much to the annoyance of the other three Smith children — Wayne, aged 14, Andrew, 12, and Darren, 9.

"Gemma knows that when she presses the Escape key up pops the cat, so we can't keep her off it," says Dennis.

£5,000 BAIT TO BEAT PIRATES

A COMPUTER games company is offering £5,000 to anyone who can beat the software pirates.

The directors of A & F Software — makers of the best-selling Cylon Attack and Chuckie Egg games — say they are sick of having their best games copied.

Now they want a foolproof way of making their tapes copy-proof.

Already, they've had several replies to their offer, including one from a mystery sixth-former who insisted on a mid-

night meeting in a car-park.

A & F director Martin Hickling told *Micro User* that some computer club members spend hours every week duplicating tapes for their friends — thereby risking hefty fines or jail sentences.

Now A & F are mounting a two-prong anti-pirate campaign.

They intend to prosecute every pirate they catch for copyright infringement. And they plan to attack the problem at source by manufacturing copy-proof tapes.

TV is scheduled

a series of five programmes presented by the ever-green Ian McNaught-Davis, who attempts to explain the revolution in office technology. BBC Publications also plan a book to accompany the series.

The programme will be seen on BBC-2 on Thurs-

day evenings with a repeat on BBC-1.

Looking further ahead there are plans for a regular topical television series for micro users to start in the autumn, a sort of 'chip shop' for television.

1985 will see two further programmes. "The

Learning Machine", will be a series aiming to increase understanding of how the micro can assist learning, while "Technology and the Handicapped" will seek to explore the many possibilities of information technology for helping handicapped people.

BARRY WOOD'S TAILPIECE

WE were chatting with one of those lovely people from Acorn the other day, and the subject of naughty foreigners copying the Electron came up.

"Oh I don't think there's much chance of that," commented one of Acorn's best. "We can't even copy the thing ourselves..."

OUR technical editor's wife rang up the other day to say he was ill.

"He's sitting up in bed writing flow charts for his programs — so he must be ill."

LOVELY little footnote at the end of a piece of software sent in for review to the effect that "when you've completed your review, please check up to see if we've released another version of it before you publish anything".

In other words, the

product supplied is fit enough to be sold to the public but not fit enough to be discussed in public...

A PROGRAMMER, selling his latest game to a leading software house, asked for an advance of several hundred pounds for equipment to develop his latest idea on.

When asked what he wanted to use the money

for, he replied, "I'm going to buy a piano".

Was his next program going to be musical then?

"No, it's for my wife — to keep her busy so I can get on with my programming".

ACORNSOFT had to deal with one very irate customer, complaining that their 'compute-a-mate' program, I Do, was grossly inaccurate

— it proved he was compatible with his wife.

I WAS admiring the matching case used by one company for their latest BBC add-on.

"Acorn sold us some of their second processor boxes", said the proud designer.

Well, Acorn aren't using them for much at the moment, are they?

BBC Soft sales top the £1m mark

BBC Soft has sold more than £1,000,000 of software since the start of the Computer Literacy Project – and they plan to sell a lot, lot more this year.

The list of proposed software releases by BBC Publications reads like a beginners guide to software for the BBC Micro.

Three titles will be released this month.

The first is *Structured Basic*, a book exploring the role of BBC Basic in writing well-structured programs. The book will be accompanied by a software cassette.

Absorbing

There will also be *Game Core*, a utility which, it is claimed, will aid the creation of simple and highly absorbing board games.

Finally there is *War-games*, intriguingly called "a family computer activity".

As might be expected, education is not being neglected, advanced music and science topics being among the further titles planned for later in the year.

No BBC divorce, says Acorn

ACORN has hit out against "mischievous speculation" over the future of its contract with the BBC to market the BBC Micro.

The company has been particularly displeased by reports which suggested it may lose out to a competitor when the agreement comes up for renewal in August this year.

In the light of this, it has released an official statement denying any rift exists and claiming that the two organisations are "working towards the renewal of the marriage vows, not a divorce".

The full text of the statement reads:

Some reports that Acorn Computer's three-year relationship with the BBC could soon be terminated overlook some pertinent facts which ought to suggest the opposite.

The alliance of the BBC and Acorn has been – and continues to be – an outstanding British success story.

More than 250,000 BBC Microcomputers, which are designed and marketed by Acorn, have been sold, with sales currently running at 25,000 units per month; eight out of ten schools with microcomputers have chosen the BBC

'Mischievous speculation' rapped

Microcomputer System; many hundreds of new jobs have been created at Acorn and at its sub-contractors' plants.

The system has won international acclaim and is now making an important contribution to the British export drive; and, last but not least, the BBC has earned several million pounds in royalties from sales.

Achievements

All these achievements in the most competitive of all technology markets!

The BBC, surely, would have to have very strong reasons for breaking off such a successful collaborative venture to enter into a new partnership.

The more so, since educational establishments and viewers would be less than pleased to

discover that, having made a major financial investment in the BBC Microcomputer System, subsequent computer literacy programmes were to be based on a quite different microcomputer system.

The facts are these:

- Acorn enjoys a close relationship with the BBC and is collaborating with the Corporation on future computer literacy projects and products.

- The present three-year agreement does not expire until August 1984 but, as is normal business practice, the terms of the new contract are already being discussed.

- As is also normal business practice, other microcomputer companies have approached the BBC.

- While the BBC did not seek tenders, we recognise that it is obliged to give proper consideration to proposals put forward by Acorn's competitors.

It is not true, incidentally, that if another manufacturer were chosen to produce the

next generation of BBC computers, Acorn would be prevented from selling the present model altogether.

But that's hardly relevant. Contrary to mischievous speculation, we – and the BBC – are working towards renewal of the marriage vows, not a divorce.

Despite these words of assurance, it seems safe to speculate that the contract is not yet cut and dried.

For over at the BBC it still appears to be "make your mind up" time.

Aubrey Singer, managing director of BBC Television, let this out of the bag when he acknowledged that the Corporation is discussing new models with several manufacturers.

However he declined to say how many firms were involved.

Meanwhile other top sources in the Corporation are adamant that there is no reason to talk to anyone other than the tried and trusted Acorn.

ACORN CHIEF WINS 'OSCAR'

A COMPUTER industry Oscar has gone to Hermann Hauser, the Acorn executive with overall responsibility for the company's research and development.

The joint managing director of Acorn was recently named as winner of this year's RITA (Recognition of Information Technology Achievements) award as personality of the year.

As he is currently on company business in Japan, he was unable to attend the presentation ceremony in Birmingham, so his wife Pamela received the trophy on his



Hermann Hauser

behalf from Ian McNaught Davis, who fronts the BBC Series "Make the Most of Your Micro".

Hermann Hauser holds a doctorate in physics from Cambridge where he attended the world famous Cavendish

Physics Laboratory.

It was while he was involved in post doctorate studies that he met Chris Curry, his fellow joint managing director. As a result, they eventually formed Acorn in December, 1978.

Another RITA went to Micronet 800, which received the award for the most outstanding system innovation in 1983.

This is the first time that any part of British Telecom's Prestel network has won an award for its service. It comes less than a year after launching the telesoftware venture.



Pamela Hauser receives the award on her husband's behalf from Ian McNaught Davies

Add 20K to your BBC micro in five minutes

- ARIES-B20 -

Features

- ★ Adds 20K of useable RAM to your BBC Micro
- ★ Run programs up to 28K long in ANY SCREEN MODE
- ★ Extra memory can be used directly from BASIC I and II, VIEW 1.4, FORTH, LISP, and many other existing programs
- ★ ARIES-B20 is compatible with all correctly written BBC Micro software, on cassette, disc, sideways ROM or cartridge
- ★ Don't be deceived: this product is unique - no other expansion unit has these capabilities
- ★ Complete compatibility - ARIES-B20 uses only documented MOS facilities
- ★ Fitted in 5 minutes using only a screwdriver
- ★ Simply plugs in inside the case
- ★ No soldering or cutting
- ★ (Unlike some add-on products) will cause no damage to your

BBC Micro - can be removed at any time

- ★ Incredibly simple to use
- ★ Patent applied for
- ★ Designed in Cambridge by BBC Micro experts
- ★ Top quality manufacture
- ★ Unquestionably the most important add-on ever produced for the BBC Micro
- ★ Top software houses are racing to produce the "super-programs" made possible by the extra capacity
- ★ 1 year guarantee.
- ★ Available mail-order only
- ★ Official purchase orders accepted from bona-fide educational establishments, all other trade cash-with-order

- ★ Price £99.95 including post, packing and VAT
- ★ If not completely satisfied with your purchase, we will refund your money in full providing you return the ARIES-B20 in good condition in its original packaging within 14 days

Machine requirements:

- ★ BBC Micro model B
- ★ MOS 1.2 or later
- ★ Plugs into CPU socket and 1 sideways ROM socket

Also available IEEE-488 interface.
Coming soon: Compatible ROM expansion board.

How to Order:

Send cheque or postal order made payable to: Cambridge Computer Consultants Ltd and forward to:
Cambridge Computer Consultants Ltd, FREEPOST, Cambridge CB1 1BR.
Telephone Cambridge 0223- 210677

Please send me (Qty).....ARIES-B20(s) at £99.95 (incl. p.p. & VAT).
I enclose a cheque/postal order made payable to

Cambridge Computer Consultants Ltd for £.....

Signed

Name (block letters)

Address

Post Code

Cambridge Computer Consultants Ltd, FREEPOST Cambridge CB1 1BR
Telephone Cambridge 0223-210677



BBC MICRO ^{IN} MANCHESTER

BBC MODEL

C

ONLY £499

includes Disc Interface and
Wordprocessor

C ★ TECH

COMPUTERS



184 Market Street,
Hyde,
Cheshire SK14 1EX

061-366 8223

BBC MODEL B	£399	BBC MODEL BD	£469
BBC MODEL A	£299	(Model B with Disc Interface)	
ELECTRON		£199	

All BBC Computers come with free cassette leads

PRICES ...

All our prices are constantly moving, so please ring us to check the latest price.

DISC DRIVES Complete - No hidden extras

100K SLIMLINE 55A (200K) **£179**

400K SLIMLINE 55F (800K) **£259**

Disc Drive Kits from **£90 + VAT**

D/D Blank Diskettes (fully guaranteed) only **1.49** each

NEW 3" MICRO DRIVE

ONLY **£129.95** all inclusive

Complete 3" DISC SYSTEM with interface

ONLY **£198.95**

INTERNAL ADD-ONS Includes fitting while you wait.

Acorn DFS **£79.95**

LVL Double Density DFS **£89.95**

Acorn Speech Synthesiser **£55.00**

CTECH Chip Chat **£39.95**

View Wordprocessor **£59.00**

Wordwise Wordprocessor **£39.95**

MONITORS

Microvitec £249 Sanyo Green Screen **£89**

Fidelity TV/monitor only **£228.85**

BMC Green Screen only **£99**

BBC ANALOGUE JOYSTICK

ONLY **£14.95**

PRINTERS includes Cables, Paper and Screen Dump Programs.

STAR 10-X

120 CPS, 10 character sets,
down loadable character set,
friction, tractor, roller feed.
Centronics I/F, true descenders,
etc.

ONLY **£269**

SILVER REED

EXP500

DAISYWHEEL

A daisywheel at low cost from a
company with backup!

ONLY **£299.00**

+ VAT

MODEMS

OEL 200 PRESTEL MODEM
with 1200/15 and 1200/1200
at the amazing price of

£79.95 + VAT

Prestel and Micronet software
available NOW!!

SECOND PROCESSORS

Z80 64K RAM **£299 + VAT**

Z80 64K RAM with SAGE or PERFECT software **£375 + VAT**

6809 64K RAM FLEX O/S **£289 + VAT**

SECOND PROCESSOR SOFTWARE

SAGE INTEGRATED ACCOUNTS:

Sales, purchase, stock control - included with
Z80 64K RAM card only **£375 + VAT**

Available for 6809:

Pascal, Cobol, Forth compilers. Also 6800, Z80, 6809 and
6800 Assemblers and Cross Assemblers.

FREE DELIVERY TODAY (Orders over £90)

If you are in Greater Manchester, Cheshire,
Lancashire, Merseyside, West Yorkshire or
South Yorkshire, if you ring us now we can
send one of our highly trained staff to install
your computer equipment Today.

AS USUAL LOADS OF SOFTWARE AVAILABLE

RING 061-366 8223

"I was pleasantly surprised to receive your parcel yesterday only 2 working days after I first wrote to you - not many suppliers in the small computer market manage such a fast turnaround time."

J.L., London

BBC Microcomputers Price £ inc VAT

ANB01	BBC Microcomputer Model B	399.00
ANB02	BBC Microcomputer Model B + Econet	447.51
ANB03	BBC Microcomputer Model B + Disc	498.19
ANB04	BBC Micro. Model B + Disc & Econet	545.20

BBC Microcomputer Compatible

Disc Drives		
BBC31S	Single 100K drive	201.25
BBC31D	Dual disc drive 2x100K	362.25
BBC32S	Single 200K double sided drive	258.75
BBC32D	Dual double sided disc drive 2x200K	483.00
BBC34S	Single 400K double sided 80 track disc drive 40/80 track switchable	327.75
BBC34D	Dual double sided 80 track disc drive 40/80 track switchable	603.75

All disc drives supplied with connecting cables, utilities disc and manual.

BBC Microcomputer Compatible Floppy Discs

BBC40TS	Single sided 40 track discs Box of 10	17.25
BBC40TD	Double sided 40 track discs Box of 10	28.75
BBC80TD	Double sided 80 track discs Box of 10	36.80

BBC Microcomputer Compatible Monitors

14MON	Microvitec 1431 colour monitor	247.25
12MNON	NEC 12" high resolution monitor Green phosphor	159.85
9MON	NEC 9" high resolution monitor Green phosphor	148.35
STAND	Monitor stand	11.44

BBC Microcomputer Accessories

ANC01	2nd Processor 6502	195.50
ANC04	2nd Processor 280	339.25
ANE01	Teletext receiver	225.00
BBC45	Pair of joysticks	13.00

BBC Microcomputer Upgrade Kits

BBCA2B	Model A to B upgrade kit	69.00
BBC3	Disc interface kit	97.70
BBC3D	Double density disc interface kit	103.45
BBC7	Econet interface kit	70.00
ANB14	Speech interface	55.00

BBC Microcomputer Econet Accessories

AEH18	10 Station lead set	28.75
AEH15	Terminator box	35.00
AEH14	Clock box	45.00
AES20	Fileserver Level 1	99.00
AES21	Fileserver Level 2	249.00
AEH17	100m Econet cable	99.00

Acornsoft Languages

SBL01	Forth cassette	16.85
SBL02	Lisp cassette	16.85
SBL04	Microtext cassette	55.60
SNL02	Lisp 40 track disc	19.90
SNL01	Forth 40 track disc	19.90
SNL04	Microtext 40 track disc	59.80
SNL03	BCPL Rom disc & Manual	99.65
SBB03	View ROM	59.80

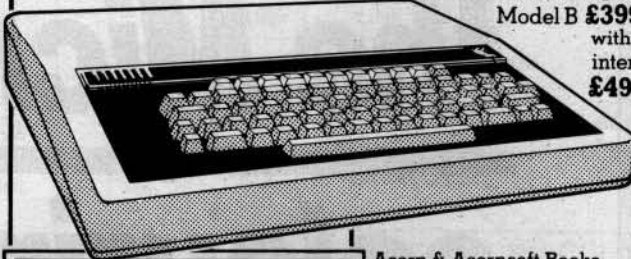
BBC Microcomputer Cables and Connectors

BBC21	Printer cable inc Amphenol plug	14.95
BBC22	User port connector + 36" cable	2.83
BBC23	Cassette cable 2x3.5mm + 1x2.5mm jacks	4.03
BBC24	7 pin din pl. (cassette int)	0.69
BBC25	6 pin din pl. (RGB output)	0.69
BBC26	5 pin din pl. (serial int.)	0.69
BBC27	5 pin din pl. (Econet int.)	0.69
BBC35S	Data cable single drive	9.77
BBC35D	Data cable dual drive	14.38
BBC36S	Power cable single drive	5.17
BBC36D	Power cable dual drive	6.32

"Once again, many thanks for your speedy and efficient service."

B.Y., London

BBC Microcomputers
Model B £399.00
with disc interface
£498.19



"Thank you for your prompt, helpful service."

J.W., Langley, Berkshire

"I am impressed with your quick and efficient service."

R.N., Peterborough

Acorn & Acornsoft Books

SBD01	Creative Graphics	7.50
SBD02	Graphs and Charts	7.50
SBD03	Forth	7.50
SBD04	Lisp	7.50
SBD07	View guide	2.50
SBD08	Into View	2.50
SBD10	BCPL Manual	15.00
ANJ01	User Guide	10.00
BBC37	CCU DFS Manual	1.00

BBC Microcomputer Compatible Printers

RX80	Epson RX80 printer	310.50
FX80	Epson FX80 printer	425.50
LIST	Box listing paper 2000 sheets	14.95



SPECIAL TELEPHONE NUMBER DISS (0379)
FOR FAST, IMMEDIATE SERVICE, 898751
TELEPHONE YOUR ORDER TO: 898751



Carriage Charges

Computers, Monitors, & Printers by Datapost	8.63
Disc drives, paper, 2nd Proc, Teletext	5.75
Normal post	1.15
Books and joysticks by normal post	0.86
All other items by normal post	

Terms

All items offered subject to availability. All prices include VAT which is charged at the prevailing rate (currently 15%) as shown above. Government, Local Authority and educational establishment official orders welcome. Account facilities available subject to status otherwise strictly cash with order. Credit cards (Access & Visa) accepted with no surcharge on all items except BBC Microcomputers. Full refund, if requested, on out of stock items.

Delivery

Most items are available ex stock and orders received up to 3PM will be despatched the same day.

Guarantee

All products are guaranteed for 12 months from date of purchase irrespective of original equipment manufacturers guarantee.

Telephone Orders

24 hour service (ansaphone after hours) available for telephone orders.

Prices: all prices INCLUDE

V.A.T. but NOT carriage. Please add the carriage to your order.

"Fantastic service - I wish more people were as 'on the ball' as you are."

T.P., Tiverton, Devon

If you think our prices are keen, wait 'til you try our service.

Quality:

We only sell prime branded products from the industry's leading manufacturers such as Texas Instruments, Motorola, National etc. They are all current production with recent date codes. We do not buy sub standard products, manufacturers surplus or job parcels.

Reliability:

All systems products are fully tested before despatch and are guaranteed to be in good working order. All faults reported are fully investigated and promptly put right. Investigation has revealed that the vast majority of these faults have occurred as a result of damage caused in transit.

Service:

All orders received by 3.30 pm are despatched that same day by 1st class post or Datapost, stock permitting. Better than 95% of the product range is in stock in depth at any one time.

Value for Money:

Due to our bulk buying power and low overheads we are able to offer very attractive prices for even modest quantities. A straight comparison of our price list with any franchised distributor will reveal a huge difference - in some cases our price is a third of the competition. There are no minimum order charges and our post and packing costs are actual costs.

For **FREE CATALOGUE** post to Midwich Computer Company Limited, Rickinghall House, Hinderclay Road, Rickinghall, Suffolk IP22 1HH.

Name

Address

Telephone

MU3

MIDWICH

COMPUTER COMPANY LIMITED

RICKINGHALL HOUSE, HINDERCLAY ROAD, RICKINGHALL, SUFFOLK IP22 1HH. TEL. DISS (0379) 898751.

AS promised last month, we'll be covering colours this time, and seeing how easy they are to use.

In fact, before I give you the theory, try running Program I, and see what happens:

```
10 REM *** PROGRAM I ***
20 MODE 5
30 COLOUR 1
40 PRINT "Colour 1"
50 COLOUR 2
60 PRINT "Colour 2"
70 COLOUR 3
80 PRINT "Colour 3"
```

It writes in three different colours! The way you get the micro to change the colour of its writing (we should really say text) is to use the COLOUR command.

COLOUR 1 causes it to print text in colour 1 from then on. In Mode 5 colour 1 is red.

COLOUR 2 causes text to be printed in colour 2. As you can see, in Mode 5 this is yellow.

COLOUR 3 obviously gives white.

So, in Mode 5 COLOUR 1 gives red text, COLOUR 2 gives yellow text, and COLOUR 3 gives white text. Actually, you can fiddle with this, but more of that later.

When you think about it, there are four colours on the screen – the red, yellow and white writing in the foreground plus a black background.

You can actually choose to write in black if you want to by using COLOUR 0, but you won't notice it against the black background. If you don't believe me try adding these lines to Program I:

```
90 COLOUR 0
100 PRINT "Colour 0"
```

Now Mode 5 is a four colour mode, as is Mode 1. Can you remember the difference from last month? If not, try altering line 20 of Program I to:

```
20 MODE 1
```

and then run the program.

That's right, Mode 5 gives you 20 characters per line and Mode 1 gives you forty. The colour numbers still refer to the same colours, though.

What happens if we alter it to a two

Let's dip into the Micro's colouring box

colour mode? Change line 20 to:

```
20 MODE 0
```

You should only see "Colour 1" and "Colour 3" displayed, both in white. "Colour 2" has disappeared. This is because in this mode you have only two colours to play with, black and white.

As before, COLOUR 0 gives black. COLOUR 1 then has to be white. When it reaches COLOUR 2, the micro has run out of fresh colours so it goes back to black – hence the disappearance of "Colour 2".

The next colour is then white so Colour 3 appears as white. I think you can guess what COLOUR 4 and COLOUR 5 produce!

Now try Program II. At first glance this should produce the same results as Program I, this time using a loop. However, all is not as it seems, since it's in Mode 2, a 16 colour mode. Try running it and see.

```
10 REM *** PROGRAM II ***
20 MODE 2
30 FOR loop%=0 TO 3
40 COLOUR loop%
50 PRINT "Colour ";loop%
60 NEXT loop%
```

COLOUR 1 still gives red, but COLOUR 2 now gives green, and COLOUR 3 yellow.

An important point coming up. These colour numbers do not mean fixed colours. As we've just seen, 2 is not

always yellow, 3 not always white, and so on. The meaning of the colour numbers varies according to mode.

To sum up, the meaning of the colour numbers depends on the "logic" of the situation. So they are officially called logical colour numbers.

So, in the correct jargon, COLOUR 2 causes foreground text to be written in logical colour 2. As we have seen, in Mode 5 this is yellow, in Mode 2 it is green and in Mode 0 it is black.

The point is that logical colour numbers can be interpreted as different actual colours on the screen depending, for instance, on the mode.

To see all 16 colours in Mode 2, alter line 30 to:

```
30 FOR loop%=0 TO 15
```

and run it. Notice that it's 0 to 15 – this does in fact give 16 different colours!

The logical colours from 0 to 7 should be fairly obvious, but what's going on with all those flashing colours from 8 to 15?

Well, logical colour 8 flashes between black and white, logical colour 9 between red and cyan, and so on. If you can't make out all the pairs yourself, Figure I summarises them.

It may seem odd that there are two pairs flashing between black and white. This is because colour 8 flashes black then white, while colour 15 flashes white then black.

None too clear, is it? Program III should help.


```

10 REM *** PROGRAM III ***
20 MODE 2
30 COLOUR 8
40 PRINT TAB(0,12)*"Colour 8"
45 COLOUR 15
50 PRINT TAB(0,13)*"Colour 15"

```

This shows that while they flash between the same two colours, they are not in step. When colour 8 is showing white, colour 15 is showing black and vice versa. The same logic applies for the other flashing pairs.

One irritating point about Program III is the fact that it leaves text in colour 15 – everything you type in flashes. Most annoying!

You can stop this by entering:

```
COLOUR 1
```

after which the rest of the text will appear in red.

So far the logical colour numbers we've been using have changed the colour of the foreground text. Let's try altering the background colour.

Change mode with:

```
MODE 5
```

Then enter:

```
COLOUR 129
```

and then type in some random letters.

Hey presto, you still get white letters, but each individual letter is on a red background.

What happens is that if you want a red background to your numbers you simply add 128 to the logical colour number for red (1) and use the sum in the colour statement. Hence the use of COLOUR 129.

So, to put the letters on a yellow background you would use 128 plus 2, the logical colour for yellow. That is, COLOUR 130.

However, white letters on a yellow background look awful, so let's change the foreground text colour to red at the same time.

Entering:

```
COLOUR 130
COLOUR 1
```

should have the desired effect.

Actually we could have achieved this by entering the one line:

```
COLOUR 130:COLOUR1
```

The colon separating the two statements allows us to put them on the same line. It's the Basic equivalent of putting a full stop between sentences.

Try:

```
COLOUR 2: COLOUR 129
```

Can you work out how this gives you yellow foreground text on a red background?

Now, when we changed background colours, only the background of

Program IV illustrates the background colours available. Each time through the loop (lines 30-80), the background colour is increased and line 40 chooses a new background colour ($loop\%+128$) as $loop\%$ increases each time through the loop, and line 50 clears the screen to this colour.

Line 60 prints out the new colour number for all the world to see, while line 70 introduces a pause, by waiting for a key to be pushed. The loop then

FLASHING COLOURS

Colour pair	Logical colour number
Black-White	8
Red-Cyan	9
Green-Magenta	10
Yellow-Blue	11
Blue-Yellow	12
Magenta-Green	13
Cyan-Red	14
White-Black	15

Figure 1: The logical colours' flashing pairs

subsequent text characters has been altered.

At the moment the background colour is red. Try:

```
CLS
```

The whole screen is cleared to the background colour, so from now on your characters appear in a yellow foreground on a red background.

To prove that Colour 0 really does give a black foreground text – I'm sure you still doubt me – try:

```
COLOUR 0
```

and type away. All should be revealed!

```

10 REM *** PROGRAM IV ***
20 MODE 2
30 FOR loop%=0 TO 15
40 COLOUR loop%+128
50 CLS
60 PRINT TAB(0,15)*"Background
Colour";loop%+128
70 pause$=GET$
80 NEXT loop%
90 COLOUR 128
100 CLS

```

takes you onto the next background colour.

Lines 90 and 100 are to ensure that you aren't left with an annoying flashing background when you drop out of the bottom of the loop.

```

10 REM *** PROGRAM V ***
20 MODE 2
30 FOR loop%=0 TO 15
40 background%=loop%+128
50 COLOUR background%:CLS
60 PRINT TAB(0,15)*"Background
Colour";background%
70 pause$=GET$
80 NEXT loop%
90 COLOUR 128:CLS

```

Program V does exactly the same as Program IV, and if you look carefully you'll see that it's equivalent – I've just used a variable (*background%*) instead of $loop\%+128$ (it's calculated in line 40). I've also put the CLS on the same lines as the Colour statements (lines 50 and 90), separating them with colons.

Well, that's all for this month. I told you it was easy! More on colour next month.

WATFORD ELECTRONICS



Dept. BBC, CARDIFF ROAD, WATFORD, HERTS. ENGLAND.

Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC



BBC MICROCOMPUTER

Model A—£260; Model B—£346

Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

● BBC1 16K Memory (8 x 4816AP-3 100ns)	£24.00
● BBC2 Printer User I/O Port	£8.10
● BBC3 Disc Interface Kit	£95.00
● BBC4 Analogue I/O Kit	£8.25
● BBC5 Serial I/O Kit	£8.50
● BBC6 Expansion Bus Kit	£7.75
● Complete Mod. A to B Upgrade Kit	£55.00

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies. £3.95

BBC PRINTER GP100A



10" Tractor Feed, 80 columns, 30CPS Normal & Double width Char, Dot res graphics. Parallel Interface standard. ONLY £155 (£7 carr.)

INTERFACE CABLE

BBC to Seikosha Cable £8.00

DUST COVER for GP100 £3.95

FRICTION FEED

Attachment for GP100A or 250X Printers £26

● Spare RIBBON for GP80	£4.50
● Spare RIBBON for GP100	£4.95
● Spare RIBBON for GP250	£5.95

GP-700 Colour Printer Screen-dump routine in ROM FOR BBC Micro £12



Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Graphics. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY £235 (£7 carr.)

RX80 F/T PRINTER

As above but has both Friction and Tractor Feed.

£259

Epson FX80 Printer

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY £345 (£7 carr.)

Epson FX100 Printer

Same as FX80 but has a 15" wide Carriage £495

	Ribbons	Dust Covers
MX80FT	£4.75	£4.50
MX100	£10.00	£5.25
FX80	£4.75	£4.95
RX80	£4.75	£4.50

PRINTER INTERFACE BUFFER

Neatly packaged self contained box, supplied complete with all leads, manual and detachable power supply.

Price: 16K Unit £99
Price: 48K Unit £135

BROTHER HR-15

DAISY-WHEEL PRINTER

An exceptionally high quality daisy wheel printer at the price of a dot matrix printer. 18CPS; bi-directional, 3K of buffer; has clear buffer facility, carriage skip movement, proportional spacing; underlining; bold print and shadow print. Prints in two colours; super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: single sheet feeder takes up to 150 A4 sheets; a keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in beige.

Special Introductory Offer

ONLY £375

Single Sheet Feeder	£199
Keyboard	£150
Ribbon	£3
Daisy Wheel	£18

LISTING PAPER

8½" or 9½" Fanfold paper plain or ruled (1000 sheets) £7 (£1.50p carr.)

15" Fanfold paper (1000 sheets) £9 (£1.50p carr.)

Teleprinter Roll (econo paper) £4 (£1.50p carr.)

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, etc., Printers.

ONLY £8
£12

Special Extra long (60") Cable

DATA RECORDER & ACCESSORIES

Top quality Slimline, portable Data Recorder for computer use. Mains/Battery, operated with counter £24.00

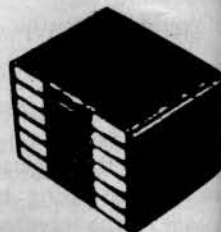
DATA RECORDER CABLE

For our Data Recorder to BBC Micro £2.50

DATA CASSETTES Top grade C12 Data Cassettes in library cases. 36p

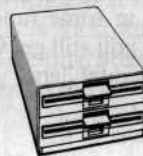
STAK-PAK

The unique computer program filing and storage system. Made of tough black plastic these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two Agfa C12 Cassettes with labels plus external index card. Five twin Paks (10 Cassettes) (Postage £1.00) £6



DISC DRIVES (CUMANA)

(All Drives new slimline 5¼" type)



DRIVES WITHOUT POWER SUPPLY

- TEC Slimline, Uncased, Single Sided 40 track, 5¼", 100K £125
- TEC Cased, Single Sided 40 track, 100K incl. Cables £139
- LCS400 MITSUBISHI, cased, Single, 80 track, Double sided, 400K plus Cables £199
- LCS400S MITSUBISHI, cased, Single, 80 track, 40/80 track switchable, Double sided, 400K with cables £215
- LCD800 MITSUBISHI, cased, Twin, 80 track, Double sided, 800K plus Cables £375
- LCD800S MITSUBISHI, cased, Twin, 80 track 40/80 switchable, Double sided, 800K with cables £425

CASED DRIVES WITH POWER SUPPLY

- CS100 TEC Single, 40 track, single sided, 40 track, 100K £165
- CD200 TEC Twin, 40 track, single sided, 200K £325
- CS200 TEC Single, 80 track, single sided, 200K £230
- CD400 TEC Twin, 80 track, Single sided, 400K £430
- CS400 MITSUBISHI Single, 80 track, Double sided, 400K £299
- CS400S MITSUBISHI Single, 80 track, Double sided, 40/80 switchable, 400K £340
- CD800 MITSUBISHI Twin, 80 track, Double sided, 800K £499
- CD800S MITSUBISHI Twin, 80 track, Double sided, 40/80 switchable, 800K £550
- Carriage on Drives £7 (Securicor)

5¼" DISKETTES

(2 years warranty)

● 10 WABASH Diskettes S/S	£15
● 10 WABASH Diskettes D/S	£25
(Lifetime warranty)	
● 10 Verbatim or 3M Diskettes S/S	£17
● 10 Verbatim or 3M Diskettes D/S	£27

DISC ALBUMS

Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. **ONLY £4.95**

PLASTIC LIBRARY CASES

for Disc Storage 5¼" (holds 10) **£2**

LOCKABLE STORAGE UNITS

Attractively finished, strong beige plastic base fitted with dividers. Smoke acrylic top. Supplied with adhesive title strips for ease of filing.

● M-35 Holds upto 35 mini discs	£14
● M-85 Holds upto 85 mini discs	£18

FLOPPY HEAD CLEANERS

Unless your office/home is dust free, you should clean heads at least once a week to avoid the risk of cross contamination.

Simply apply the cleaner to one of the specially formulated cleaning discs, insert into the drive and initialise. If your system has no initialisation program then insert the disc and open and close the door 5 times.

£16.00

BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12" Green or Amber Monitor, Twin 200K highly reliable (1 year warranty) Twin Cased Cumana Disc with own power supply, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother HR15 Daisy Wheel Printer, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software discs, 10 blank diskettes, 500 sheets of fan-fold paper. Manuals and all the leads.

All you require is a mains power point to have it up and running (we even supply the 4 way mains trailing socket).

ONLY £1,350 (carr. £15)

(P.S. We will alter the package to suit your particular requirement. Call in for a demonstration.)

MONITORS

MICROVITEC 1431

14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£205**

● **MICROVITEC 1451** Hi-res 14" Monitor incl. lead **£319**

● **NEW MICROVITEC 14"** Colour Monitor/Composite Video **£249**

● **KAGA RGB 12"** Medium Resolution Colour **£210**

● **KAGA RGB 12"** High Resolution Colour **£259**

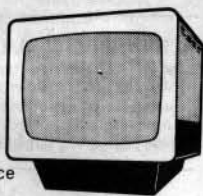
● **KAGA 12"** Standard resolution colour MONITOR/COMPOSITE VIDEO **ONLY £219**

● **BNC** Connecting Lead **£3**

● **RGB** Connecting Lead **£5**

● **ZENITH 12"** Green or Amber Monitor Hi-resolution **£75**

Carriage on Monitors £7 (Securior)



READY-MADE LEADS

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50
Monitor Lead, BNC to PHONO	£3.00
Disc Drive to BBC Micro Power Lead	
Single: £3.00 Dual £3.75	

NEW

Mk II 13 ROM SOCKET BOARD

Now all lines fully buffered - On board battery back-up facility - will accept 2716, 2532, 2764 and 27128 ROMs.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied.

Our 13 ROM SOCKETS BOARD enables the User to increase the Sideways ROM capacity the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY £29.95 (carr. £1)

EPROMS & CMOS RAMs for BBC

2764-250Ns (8K ROM)	£5.95
27128-250Ns (16K ROM)	£18.00
6116-150Ns (2K RAM)	£4.75
6264-150Ns (8K RAM)	£26.00

Z80A 2nd PROCESSOR BOARD for BBC Micro

● Although intended as a BBC add-on, it is totally stand alone (i.e. Can be used with any RS232 Terminal/Computer).

● Z80A Processor running at 4MHZ (No. wait states) 64K Dynamic Memory, 16K ROM space. Disc interface with single/double density, 40/80 track, single/double sided. Two serial channels at independent BAUD rates. Parallel printer interface.

● No additional drives are needed other than those already being used on the BBC as the disk drives can be shared or can be run on the Z80A Processor alone. (This unit can be operated without the disc interface inside the BBC.)

● **EXPANSION - OPTIONS**
IEEE-488 GPIB Interface with Control, Talk and Listen
Ram in 64K and 192K increments
Hard DISC INTERFACE (to controller)
Dual Parallel Interface
8" Floppy Disc Controller
Dual Serial Interface
Real Time Clock
Prototypeboard

(Also another 64K Ram card can be plugged inside the unit)

● CP/M 2.2 - Not a lookalike, making the CP/M Users Group available to you.

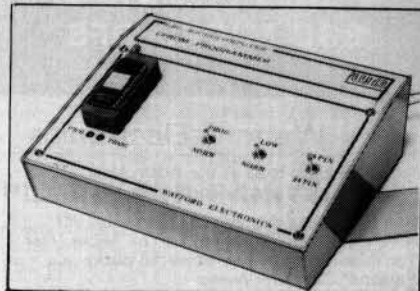
● All BBC screen, sound and OSBYTE facilities available to the CP/M user.

● Uses a full intelligent terminal emulator to enable the user to run 99% of all commercially produced CP/M software with no modifications whatsoever.

● Supplied in a standard half height drive case with integral PSU and finished in the standard BBC colour.

All this and more for **ONLY £350** plus VAT.

EPROM PROGRAMMER for BBC MICRO



At last! - the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMs from 2K bytes up to 16K bytes - **2716 - 2516 - 2532 - 2564 - 2764 - 27128.**

This extremely powerful system is designed for your needs of TODAY & TOMORROW! - BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

● **COMPLETELY SELF CONTAINED** -

Housed in its own sturdy case - Uses its own power supply - connects directly to the 1MHz Bus - Simple and Safe!

● **FULL SOFTWARE SUPPORT** - Comes

complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Verification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! - This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.

● **ACORN BUS COMPATIBLE** - Use of the 1MHz connection complies with all Acorn addressing recommendations - That means you can still add-on such things as the TELETXT, IEEE 488 TUBE and PRESTEL

● Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY £89 incl. Manual (£3 carr)

BEEB SPEECH SYNTHESISER

VERSATILE SPEECH SYNTHESISER UNIT FOR THE BBC MICROCOMPUTER

Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! - An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis - That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent - Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system - Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit - The whole system is built into a small case - easily tucked behind the computer. Auxiliary output socket provided for direct connection to an external amplifier.

HOURS of fun! - Suitable for any application - Games, Educational Programs, Specialised Packages.

We know this all seems too good to be true but **DON'T BE LEFT SPEECHLESS!** Order your Versatile Speech Unit now!

Only £39

Continued →

★ THE ULTIMATE ★ BBC MICRO DFS

by Watford Electronics

High acclaimed at the Acorn User Show.
What do the independent press say?

Good value for money – *Beebug* Aug. '83
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package –
Personal Computer News
Superior DFS; Excellent disc sector editor –
Computer Answers

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

- * The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

- * A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

- * A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

- * A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidentally deleted files and can save weeks of work.

- * A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.

- * A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

- * When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

- * Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

- * An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

- * RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

- * OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

- * 2K of RAM can be reclaimed from the DFS by setting "PAGE" to &1100.

Now with extra features:

- * The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

- * Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.

- * To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO

Continued:

BEEBFONT ROM

BEEBFONT is a remarkable new concept in BBC software, exclusively available from Watford. Once fitted, the 16K ROM will enable you to produce attractive text displays in following different styles:



★ It works in modes 0, 1, 2, 4, using full colour.

★ Simply use Ctrl-V to select the font and all further screen output will be in a new style.

★ Even the ordinary Beeb character set can be enhanced by doubling height or width and emphasising to give bold print.

★ A comprehensive editor is included which enables the user to design his own characters.

★ A spooling program is provided which enables pre-formatted text files to be displayed on an Epson printer using the full range of character styles.

★ This really must be one of the most original and exciting products of the year.

★ A twenty page manual is provided and the demo/editor software comes on disc or cassette (please specify when ordering).

ONLY £39

DISC DOCTOR

£26

A sophisticated Disc Utility ROM with many useful commands. (For detail description please refer to Computer Concept's advert in this magazine.)

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

only £33

DFS continued:

- *A* gives information on all files in the current directory which have an "A" anywhere at all in their filename.

- * Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

- * Fully compatible with BBC TELETEx and TORCH Systems

DFS ROM ONLY £29

Complete Disc Interface Kit including DFS ROM and fitting instructions ONLY £95

Comprehensive and clearly written DFS Manual ONLY £7.50

(P.S. This manual will only be sold to those who purchase our DFS).

P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for

ONLY £25

BEEBMON

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

ONLY £25

NEW LAUNCH

★★ NEW NEW NEW ★★

IT'S HERE!!! WATFORD'S LATEST ROM
BASED SOFTWARE
DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.

Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered. All these and other facilities for

ONLY £16

(Price includes a comprehensive manual and fitting instructions.)

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included.

£36

TINY PASCAL (in 16K ROM)

PASCAL-T is capable of compiling source PASCAL into a compact very fast threaded-interpreters-code. Full editor and disc support are included. Comprehensive documentation supplied

£59

VIEW

Acorn soft's Wordprocessor ROM.

£52

ONLY THE BEST AT
WATFORD



ACCESS ORDERS BY TELEPHONE
Simply phone your order through. We do the rest

(0923) 50234/40584

NEW BEEB PRINTER ROM



Are you fed up with not being able to unravel your printer manual and use all those features you paid for? Need sensible paging for use in the creation of booklets? Then you certainly need our Beeb Printer ROM.

A machine code printer utility in ROM.

★ 'Single' key operations replace control code sequences for underline, front and size selection, paper movement, etc. Up to 30 come pre-defined, without effecting normal fn key usage.

★ Automatic fanfold page margins. Puts gaps in listings. PRINTed text etc to skip the folds. The gap size alternates to minimise paper wastage when using binders.

★ Form feed and related commands, made available on ALL printers. Can also provide a left margin.

★ User defined characters embedded within text are printed as on VDU.

★ ★ Commands select option for GP100, STAR, NEC, MX/FX, LP VII/DMP100, DMP200. Operates with parallel interface printers and is turned on by *FX5.3.

Supplied complete with Manual.

Price: £24

(When ordering, please specify the make of printer you have.)

TWO NEW GRAPHICS SCREEN DUMP ROMS from WATFORD

NEW DUMP OUT 2

A versatile machine code hi-res Screen Dump ROM.

● You can now have small or large 2 tone dumps and multi-tone 'colour' pattern dumps (8 distinct mode 2 shades) on every printer.

● *Commands initiate the required dump optional parameters may be included for colour masking and selecting the part of the screen to be dumped.

● Clever use of the processor stack means that no workspace is required! (Multitone dumps also use 2 zero page locations.)

● For GP80/100/250, STAR, NEC, EPSON MX/RX/FX, LPVII, DMP100/120/200/400.

● Screen modes 0, 1, 2, 4, & 5.

● Instruction Manual

All this for **ONLY £15**

NEW EPSON DUMP ROM

Will accurately DUMP all Screen modes including TELETEX, GRAPHICS and DOUBLE HEIGHT. MULTITONE DUMPS are also supported.

ONLY £16

DISC EXECUTOR

Disc Executor is a sophisticated disc utility, designed for the BBC Micro, which allows you to transfer almost all of your tape software to disc. It will handle 'Locked' programs and allows you to load full length adventure type programs (i.e. up to &6E blocks) from disc in seconds rather than minutes.

Price: £12

WONDERFUL WATFORD

SURGE PROTECTOR Plug

Safely eliminates dangerous voltage surges. During a thunderstorm, a nearby lightning strike can induce high voltage spikes in the voltage supply or fluctuating loads can also result in transient overvoltages which if unchecked, lead to expensive data corruption/loss. Our surge protection plug will provide the necessary surge protection. Simply replace your standard 13Amp mains plug with the surge protection plug (which is almost the same size). Ideal for computers, Hi-Fi systems, precision instruments, fridge freezers, etc. Max. surge current 2KAmp; Max. Voltage 250 Volts.

Price: £8

BBC JOYSTICKS

Two versions available:

SINGLE: Player type

£7.00 each

TWO Players type

£11.50 per pair

EDUCATION Software

JUNIOR MATHS PACK (32K) £6.95

Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

CHEMISTRY £6.00

Make learning fun with this graded program which teaches the Atomic table including Atomic Symbols, Atomic Number and normal form using a fruit machine type display. 5 levels.

WORLD GEOGRAPHY (32K) £7.00

Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG £7.80

(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

WORLDWIDE £7.80

(Age 7-15). Two constructive geography programs allowing children to build detailed data bases covering both the UK and the world. Encourages children to refer to atlas and reference books. Save the database anytime.

PHYSICS £6.00

Displays measurements of mass, work, temperature, etc., their associated units and formulas for calculating these units. For 4th and 6th formers.

WHICH SALT £6.00

Identify a compound from the result of a series of tests. Superb graphical animation shows what would otherwise be observed in a laboratory. For 4th and 6th formers.

HAPPY NUMBERS £7.80

(Age 4-6). No reading skills are required to use this colour graphics number recognition and counting program. Children build patterns of flowers corresponding to figures, quickly learning their significance.

INTRO TO ARITHMETIC £10.45

4 programs - Additions, subtractions, multiplications and divisions. Help stage, moving graphics and colours. Worksheet produced at the end of program. (5-7 years old).

PLINTH FOR BBC MICRO

Protect your micro from the weight of the heavy TV/Monitor. This sturdy plinth is attractively finished in BBC colour. It can be used to support a monitor or a printer. The micro slides underneath comfortably. A must for every BBC Micro owner, specially for those who have to move/open their computer frequently.

Price: £10 (carr. £1.50)

PLINTH FOR PRINTERS

Keeps your desk tidy. Place the printer on the plinth and the paper underneath. Finished in BBC colour.

£10 (carr. £1.50)

VOLTMACE'S DELTA 14 Hand-set

(Highly acclaimed at the Acorn User Exhibition) Save your BBC Keyboard from a games bashing with our precision, smooth, sprung return 'Delta 14' Joysticks which has a built-in 14 Button Keypad. The hand set is Acorn Soft compatible and will work as a Joystick and two Fire buttons. Adding the ADAPTOR BOX will enable the use of all twelve Buttons (plus two repeated).

A user friendly, Keyboard to Keypad transfer program allows you to assign any Keyboard Key to either Keypad button or Joystick direction. The program also allows you to adjust sensitivity on the Joystick and conversions can be saved in a library which already contains some Acorn-Soft conversions.

Price: 'Delta 14' Hand set **£12.50**

ADAPTOR MODULE **£11.95**

TRANSFER PROGRAM **Tape £5.15**

Disc £7.75

ONE STOP SHOP

ATTACHE CARRYING CASE for BBC Micro

These Attache Carrying cases are attractively finished in mottled antique brown leatherette. An ideal and very safe way to carry your BBC Microcomputer.

Price: £10 (£2 carr.)

RESERVED

This space is reserved for the launch of yet another ROM based Software for BBC Micro.
For details please read our advert next month.

EPROM Programming Service

New from Watford, a service to the writer of Sideways ROMs for the BBC Micro or any other ROMs. Send us your ROM dump on BBC format disc, 40 or 80 track stating the type of EPROM required. We will program for you 2516, 2716 (single rail), 2532, 2564, 2764 or 27128. (You may send your own blank EPROMs or purchase them from us).

Programming service charge **£8**

WATFORD ELECTRONICS

Continued

GEMINI'S BUSINESS SOFTWARE

Cashbook Accounts	£52
Final Accounts	£52
Invoices & Statements	£17.25
Commercial Accounts	£17.25
Mailing List	£17.25
Database	£17.25
Stock Control	£17.25
Home Accounts	£17.25
Beebcalc Spreadsheet Analysis	£17.25
Beebplot	£17.25
Payroll	£39

N.B. All the above Gemini software is on tape. For Disc Based (40/80 track) please add £3.

BOOKS (No VAT on Books)

30 Programs - BBC Micro	£4.95
30 Hour BASIC (BBC Micro)	£6.00
35 Educational Programs for BBC	£6.95
36 Challenging Games for BBC	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10
6502 Application Book	£10.25
6502 Assembly Lang Prog	£12.50
6502 Assembly Lang.	
Subroutines	£11.80
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
ACORN ATOM Magic Book	£5.50

Advanced User Guide for

BBC Micro	£12.85
Advanced 6502 Interfacing	£10.95
Advanced 6502 Programming	£10.50
Assembly Lang. Programming for BBC	£8.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC	£7.40
BBC FORTH	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
Easyprogramming for BBC Micro	£5.95
BBC Micro Graphics and Sound	£6.95
BBC Micro ROM PAGING System	
Explained	£2.95
BBC Micro Revealed	£7.95
BBC Micro Instant Machine Code including Software Cassette	£34.00
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative Graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
Discover BBC Machine Code	£6.95
Discover FORTH - Osborne	£11.25
Easy Prog. for BBC Micro	£6.50
Further Prog. for BBC Micro	£6.90
FORTH Programming (Sams)	£12.50
Functional FORTH for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer can Play	£6.95
Getting Acquainted/Acorn ATOM	£7.95
Graphs & Charts on BBC Micro	£7.50
Intro to Micro Beginners Book (3 Ed.)	£9.90
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£8.95
Graphics on BBC Micro	£6.95
Introducing the BBC Micro	£5.95
LISP	£9.25
Logo Programming	£8.95
Mastering VISICALC (Sybex)	£11.95
Micros in the Classroom	£4.90
Practical Prog. for BBC & ATOM	£5.95
Programming the 6502	£10.75
Programming the BBC Micro	£6.95
PASCAL	£9.25
Programming for Education on BBC	£5.95
Structured Prog. with BBC BASIC	£9.50
The BBC Micro Book, BASIC, SOUND & GRAPHICS	£7.40
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95

NEW LAUNCH

★ PENGU ★

One of the most sophisticated full colour, 100% machine code games software. This arcade game will give hours of fun. You (Pengo) are being harassed by the devouring Snobees (Snow Beesties) whose diet is the Ice-cubes and an occasional juicy Pengo!! Your only means of survival is to hurl the ice-cubes at the marauding snobees and crush them into the snow. Beware, as you crush them to death the remaining snobees turn even more vicious. Each act will bring a new species, even more aggressive!! All is not lost; Bonus points are won by lining up the three indestructible DIAMOND cubes. Progressive levels of difficulty. Bonus Pengo at 30K points. A MUST for all BBC Micro owners.

Only: £7.75

CRAWLER

A new challenge for your reflexes, exercise your fingers. Crawler is the best yet BBC version of the game popularised in the arcades as "CENTIPEDE". Blast the voracious caterpillar before it eats you. Avoid the wandering spiders. Shoot the scorpions before they poison the mushrooms. Kill the descending fleas as they cause massive mushroom growth. This game is a delight to play, the controls are responsive and fast yet precise. All this for ONLY £6.95

GAMES SOFTWARE (PROGRAM POWER)

CHESS	£6.95
CROACKER	£6.95
Escape from MOONBASE ALPHA	£6.95
FELIX in the FACTORY	£6.95
GALACTIC COMMANDER	£6.95
KILLER GORILLA	£6.95
MUNCHYMAN	£5.95
MOONRAIDER	£6.95
PENGU (Watford)	£7.75
SWOOP	£6.95
747 FLIGHT SIMULATOR	£7.75

LEVEL 9 ADVENTURE GAMES

COLOSSAL ADVENTURE. The classical mainframe game "Adventure" with all the original puzzles plus 70 extra rooms.

£8.65

ADVENTURE QUEST. Through forest, mountains, desert, caves, water, fire, moorland and swamp on an epic quest vs tyranny.

£8.50

DUNGEON ADVENTURE. Over 100 puzzles in the Demon Lord's dungeons.

£8.50

SNOWBALL. Save a 7000 location colony starship in 2302 AD.

£8.50

SEIKOSHA GP250X:

10" Tractor Feed, 80 columns, 60 CPS, normal and double - width/height characters, 128 characters with true descenders in ROM, 64 user definable characters in RAM (384 bytes) Programmed printing (80 bytes of memory) for storing your own print sequences, dot addressable graphics with repetitive graphics data printing, RS232 and Centronics parallel interfaces standard, paper empty function and buzzer, self test routine. All this for

ONLY £199 (£7 carr.)

Prices subject to change without notice.

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME. GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED. CARRIAGE: Unless stated otherwise, please add 60p to all cash orders.

VAT: UK customers please add 15% VAT to the total cost incl. Carriage.

SHOP HOURS: 9.00am to 6.00pm. Monday to Saturday. (Ample Free Car Parking Spaces) ACCESS ORDERS: Simply phone: Watford (0923) 50234. (24 Hours)

ACCESS ORDERS

Simply phone your order through and we will do the rest.

Tel: (0923) 50234

WATFORD - Always a step ahead

SPECIAL 'DISC DRIVE ISSUE' OFFER

MITSUBISHI DISC DRIVES

Cased, including Power Cable and Interface Cable. Plugs directly to BBC's Power Supply socket.

● LCS400 Single 400K Drive	£188
● LCD800 Twin 800K Drives	£369

BBC FORTH on Cassette

Follows FORTH-79 standard and has fig-Forth facilities - Provides 260 FORTH words - infinitely extensible - Full screen editor - Allows full use of MOS - Permits use of all graphic modes, even 0-2 (just) - Easy recursion - Runs faster than BBC BASIC. ONLY £15 FREE 70 page manual and a Summary card.

BBC FORTH TOOLKIT

Adds following facilities to FORTH. 6502 Assembler, providing machine-code within FORTH - Turtle graphics enables easy to use colour graphics - Decompiler routines enables versatile examination of your compiled FORTH programs - Full double number set - An example FORTH program and graphics demonstration - Other useful routines - 64 page manual included FREE. ONLY £13

LOGO II

This language is very popular in American schools as it is an ideal educational program. It can graphically demonstrate the ideas of defined procedures, sub-routines, loops and even recursive programming. Gives excellent introduction to LOGO language for young and old alike.

£9.95

TEX EPROM ERASERS

* New Broom for EPROMS *

EPROMs need careful treatment to survive their expected lifetime. Rushing it could burn their brains out. So cop-out of this helter-skelter world; take it easy the TEX way and give your chips a well earned break. Cool, gentle and affordable. EPROMPT does it properly.

Two versions available:

- EPROMPT EB - The standard version. Erases up to 16 chips. £30.00
- EPROMPT GT - Erases up to 32 chips. Has an incorporated safety switch which automatically switches off the UV lamp when the Eraser is opened. £35.00.

We stock a wide selection of games software and peripherals for BBC Micro. Why not call in at our shop for a demonstration. Be satisfied before you buy.

Watford Electronics

Dept. BBC, Cardiff Road, Watford, Herts, England.
Telephone: 0923 40588/37774. Telex: 8956095

IAN MURRAY takes an in-depth look at pitfalls facing the programmer writing educational software

PUT yourself in the mind of a 10-year-old youngster. Sorry you are a 10-year-old youngster... hop along now and fetch your mum or dad!

Good. Make certain Susan or Mike are not peeping over your shoulder. Now we can pretend what it must be like to sit in front of the screen at an age when being a teenager is like being grown-up.

There are zaps, whams and pows. You press keys and – wow! the machine obeys you.

The rocket takes off. Another key is pressed and the screen changes colour. It's wonderful.

For the first time in your short life, you are the boss and completely in control.

The machine doesn't shout at you. Mum and dad think you're great – well you haven't emptied the kitchen sink over the floor. And it's fun!

The problem for the writers of educational software is that youngsters love to experiment. Even with those simple (and dreadful) addition programs.

You are asked to choose two numbers. The first time you obey the instructions and choose two reasonable numbers.

The next time you choose two very large numbers – lots of noughts in them. The answer miraculously appears – or does it?

Type in:
PRINT 1234567890 + 345600000000
The answer: 3.46834568E11 appears.

Horror! The machine is faulty. The youngster rushes into the garden to tell dad that his computer must go straight back to the shop.

We know that the answer is in exponential format because the machine

cannot handle very large integers. But your excited youngster doesn't.

The desire to experiment with the extremes of the machine can cause yet further havoc.

The screen display may collapse or be insufficient for the answer – despite the answer being correct. Type in the following and see what happens:

```
10 CLS
20 VDU 28,10,20,16,19
30 INPUT A
40 INPUT B
50 PRINT A+B
```

Run the program with two sensible numbers – like 23 and 47. The result of 70 appears. Now run the program with 3456 and 1234567. The answer you see is 023. This is correct?

What has happened is that the VDU 28 is the command for defining a text window, and the window is not large enough for the whole answer.

This may be a trivial example – but I have seen it several times in educational software.

Alternatively, if the screen display collapses it often is impossible to get it back without reloading the software completely.

The youngster gets quickly fed up. An otherwise good piece of work lies unused because the programmer did not think like a child.

A young person will go to extraordinary lengths to experiment – not with the lesson, but with the software teaching the lesson.

The job of structuring and limiting the range of possible replies by the youngster is called validation. Good validation is the secret to good software.

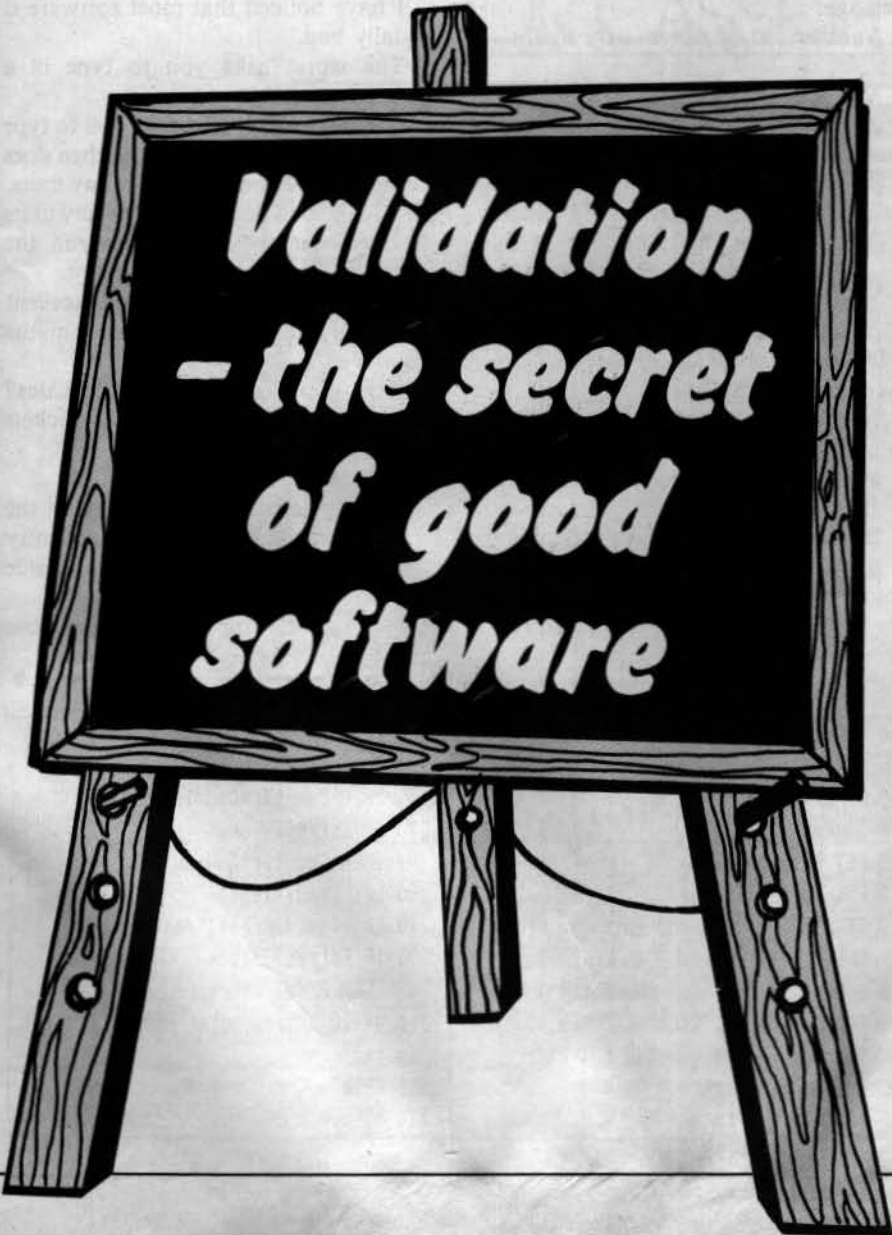
Bad validation either gives us £00.00 in our wage slip or a gas bill for £200,000.00 when we have been on holiday for two weeks.

The object of validation is not only to make software robust, but also to direct the learning of the student.

Look back at the trivial addition example above. You may not want the youngster to discover that there is a valid method of writing numbers which includes the letter 'E'.

It may lead to running before walking or even the young person being frightened off numbers by concepts which are beyond their stage of development.

Your validation will therefore include, not only length of input checks



*Validation
– the secret
of good
software*

From Page 47

and number range of answer checks, but also character checks to see that the correct type of keyboard character has been used.

As all validation is expensive on memory, you will need to develop general purpose procedures to perform the checks – and an example is given below.

Note, however, that in the BBC Micro there is a conflict between the amount of memory space given over to clever program ideas – and validation of those ideas – particularly in higher screen modes.

You have to decide whether the last screen shape is worth the possibility of the program crashing.

My general view is that with younger children – **the program must not crash.**

Listing 1, deliberately overdocumented, shows the kind of validation routine you will need.

If you specify on entry to the function the highest and lowest letters acceptable and how many you will allow the routine will input routine to those specifications (see listing below).

As it stands this is a little limited. You may accept any length up to a certain number of characters.

Then you would have to alter line 310 to just catching the Return key.

You may decide to allow capitals and small letters. You would then need a line 215 such as:

IF Entry > High

THEN Entry = Entry - 32

This spots an Ascii character larger than Z and brings the Ascii character back down to capitals for processing purposes.

All data entry, once you have limited the number of characters to be entered, should be done via a screen window.

The screen window must be large enough to take the width of the data

entry and deep enough to accommodate any error messages.

If you do this, you can keep on the screen any clever graphics, which is entertaining to the viewer without the cumbersome use of PRINT TABs to position your data entry.

You can happily clear the text window without worrying about the rest of the display.

Disc fault 18 at 00/50.

I had this error message while writing this article. It is totally uninformative, useless and encourages grown adults to tear their hair out in frenzy.

The younger generation may be more self-controlled about the hi-tech world, but useless error messages ruin software.

Youngsters are always going to examine your software and drive it to the limits. Expect it. Gently inform them that you've sussed this and they won't get away with it.

DO NOT use this as an error message:

Number out of range – try again

or:

Not valid

or worse – simply repeat the input question mark.

On data entry, you should always specify to the user what the expected range of numbers/letters is:

I like a WHOLE number from 1 to 100.

What is your number?

If then the prankster types in 999, he has done it because:

- It's a genuine error – so repeat instructions.
- He's misread – so use simpler language.
- It's deliberate over-play – so inform the user we know the prank.

Your number is no good.

Try a WHOLE number from 1 to 100. Type in again?

Error messages occupy large

amounts of memory space and are tedious to type in. So store bits of the message in string variables.

For instance:

LET Error1\$ = "Your number is"

LET Error2\$ = "Type in again?"

LET Error3\$ = "Try a WHOLE number"

You then make your error messages combinations of pre-planned error messages. You will be surprised just how much memory and typing this saves. Make certain they will all fit inside the text window!

A full description on program assistance will be given in next month's *The Micro User*.

But you should always know when the user is likely to forget part of a data entry.

Science teachers scream blue murder if we leave the units off our experiments and calculations.

"Three whats!?", they howl. "Miles – biscuit tins what?"

I have noticed that most software is equally bad.

The worst asks you to type in a distance – no idea of units.

The moderately bad asks you to type in your distance in miles – but then does not expect the user to specify any units.

You have to decide whether any units are necessary – not just to run the program, but as a learning point.

There is a good example of excellent user assistance in London's Smile maths software.

How good are you at coordinates? Do you always remember the brackets round the number (6,3)

No? Why not!

The Smile maths software puts the brackets on the screen before data entry and the numbers must be fitted inside the brackets.

Very good! You see (,) and your

10 CLS	160 REPEAT	250 LET Counter=Counter+1
20 A\$=FNinput("Z","A",6)	170 REPEAT	260 IF Entry=Delete
30 PRINT A\$	180 REPEAT	THEN Counter=Counter-2
40 END	190 Ok=FALSE	270 IF Entry=Return
100 DEF FNinput(High\$,Low\$,Num)	200 LET Entry\$=GET\$	THEN Counter=Counter-1
110 LOCAL High,Low,Counter,Entry	210 Entry=ASC (Entry\$)	280 LET Temp\$=Temp\$+Entry\$
,Delete	220 IF Entry >= Low AND Entry <= High	290 LET Temp\$=LEFT\$(Temp\$,Counter)
120 LOCAL Return,Temp\$,Entry\$	THEN Ok = TRUE	300 IF Entry<>Return
130 LET Delete=127	230 UNTIL (Counter = 0 AND Entry	THEN PRINT Entry\$;
: LET Return=13	<> Delete) OR Counter < Num	310 UNTIL (Num=Counter AND Entry=Retu
140 LET High=ASC (High\$)	OR (Counter = Num AND NOT Ok)	rn)
: LET Low=ASC (Low\$)	240 UNTIL Ok OR Entry = Delete	320 PRINT
150 LET counter=0	OR Entry =Return	330 =Temp\$

Listing 1

BREATHTAKING IMAGES FROM DISC OR CASSETTE



BREATHTAKING IMAGES FROM DISC OR CASSETTE



-SPOT THE DIFFERENCE

Happily for prospective purchasers of the Microvitec CUB RGB/PAL colour monitor there is no difference.

This superb machine produces brilliant pin-sharp images when used with a micro computer, thanks to a screen resolution of 585 pixels by 452, plus a bandwidth in excess of 15MHz. Yet the RGB/PAL also gives the highest quality pictures from laser discs, V.C.R.'s and video cameras. This is because the signal is not

modulated and then remodulated, as happens with an ordinary TV. set.

Add to this an audio facility and the result is a colour monitor which sounds as good as it looks.

Finally, perhaps the best news for

purchasers is that the CUB colour monitor represents a real investment. However dramatically computers or video systems may change in the coming years the means of displaying their output is unlikely to alter – you can't improve on the best.

Find out just how inexpensive quality can be by calling at your local computer dealer. Alternatively, contact Microvitec direct for full details of the breathtaking range of CUB colour monitors.

MICROVITEC
CUB
COLOUR DISPLAYS

Microvitec Ltd., Futures Way, Bolling Road, Bradford BD4 7TU. Tel: (0274) 390011. Telex: 517717

ENTER THE SOFTSPOT AMUSEMENT ARCADE...

Fruity Freddy

Electro Freddy the Sequel to be launched early April



Programming by
Chris Butler. All O.S.

Young Freddy has decided to raid Mr. Meano's back garden, collecting the growing fruit before they run to seed. Tread on the fruit before they're ripe and Mr. Meano will be after you. Avoid the pesky bees or kill them with the can of DDT. Look out for the Crazy Crimson Caterpillar and the sparrow with its deadly droppings, but grab the sweets, drinks and other goodies. Can you make Freddy's perilous task fruitful? Smooth multi-coloured graphics and all arcade standard features make this a most enjoyable machine code game.

FUNFAIR

BONUS BOX



Programming by
Stuart Low. OS1.2 only.

All the fun and thrills of the funfair are brought to life in your BBC Computer as you fire at the targets that can fly down and eat your limited supply of bullets. Hit the bell with the slider to prevent more targets appearing. Amusing graphics and realistic sound effects make this another 100% machine code winner from Softspot.

HEIST

"Heist is a game full of good points and makes an amusing and exciting change."
- Your Computer



Programming by
Marcus Altman. All O.S.

"Look out investors your local bank is being robbed!" Manoeuvre the bank manager around the building, collecting money bags and returning them to the vault - Dodge the ever chasing robbers or bop them on the head with a hammer. Beware of the time bomb which you must defuse or you will sprout wings and fly to heaven.

Enjoy a refreshing cup of tea for bonus points, game increases with difficulty on each level. Features include fast smooth multicoloured characters, excellent sound effects, background music. Very addictive and fun.

TRANSISTORS REVENGE

"Not since Planetoids have I been so impressed with a BBC program."
- Computer & Video Games



Programming by
Chris Butler. All O.S.

Your BBC Micro is under attack! The components on the circuit board are attacking the CPU. Can you stave off the many marauders by firing pulses of electricity along the data lines of the 6502. Beware of the deadly mains spikes zipping along the tracks and hit the tools on the edge of the circuit for bonus points. For emergencies only the ZAP button will destroy everything with an explosion of debris.

ALL PROGRAMS RUN ON ALL CURRENT O.S. AND BASICS ALL TAPES GUARANTEED

PRICES: Disk
Cassette £10.45 each
£7.95 each All prices inclusive

SOFTSPOT

29 SOUTH CRESCENT
PRITTEWELL
SOUTHEND
ESSEX SS2 6TB

From Page 48

first numbers enters to the left of the comma and the second to the right. To program this is easy — it just requires thought.

The £ sign is a constant problem. It can easily be catered for by typing:

PRINT "£";FNinput("0","9",4)

Then the user is in no doubt about what is required. There is always a conflict here between teaching and being too supportive.

With the brackets a happy compromise would be to generate the brackets from the program if the user had not done so within a specified period of time.

The INKEY command will help you here. A little teaching reminder about brackets would not go amiss when the user is late with the brackets — and then on with the software.

Mum gives Jonathan his computer for a birthday. Within weeks he settles down. She buys him educational software.

Before very long she's telling the neighbours: "He's so fast — he's learnt

so much. He gets all the sums right".

Marge rushes straight off to buy her Sarah a BBC Micro hoping that the same brilliance will attack her youngster.

It does — well not really. Jonathan and Sarah have learnt the software — not the lesson.

Take those dreadful speed addition programs. The youngsters, as you watch them, hardly wait for the sums on the screen before they type in the answers.

Basically they are tackling the additions in the same way that Snapper or Frogger are played. They have spotted the "pattern" that makes the program work.

When you put fixed data into your programs, this will always happen. In some cases you cannot avoid fixed data, such as names of places and objects.

But where you can you should always try to use the random number generator in Basic to generate a sample of data.

It is an awful waste of the programmer's time and your money, when you purchase a very pretty program which the youngsters can learn

to do in five minutes.

This is the case with the BP Oil Slick program.

It is an environmental studies game, but the youngsters learn which way to disperse the slick by working out how to beat the program.

I have found that they end up with little understanding of the problems of pollution — which is a pity — unless they are restricted as to the number of times they can play.

With more random data this might not have happened. It also explains why the graphics programs are so good, because here the user selects the data for the graphics, using the computer as a tool.

This should give you some idea of the pitfalls facing the programmer writing educational software.

In next month's article I shall be discussing how to entertain the user.

The extended facilities of the BBC Micro allow us programmers a lot of scope for keeping the attention of the user.

Suffice it to say that a good monster can do wonders for a banal program.

ADS. THE ULTIMATE IN PERIPHERALS FOR THE SPECTRUM, JUPITER ACE & BBC MICROCOMPUTERS

"Highest quality peripherals at the lowest possible prices" — that's the philosophy at Advanced Digital Systems. Our team of highly experienced designers use the very latest techniques to produce adaptable home computer peripherals — at a price you can afford.

- Boards are designed using CAD/CAM, giving a neat optimum layout.
- Gold plated connectors are used, wherever possible, to ensure good electrical contact.
- All products carry a 12 month guarantee.
- All units are "Plug in and go".

1 PRINTER INTERFACE 1
Centronics Interface for the Sinclair Spectrum. £34.50 inc. VAT. Comes complete with approx 1 metre of cable, centronics plug and software.

- Software recognises LLIST and LPRINT enabling Print-outs direct from Basic. Also adaptable COPY routine for graphics printers.

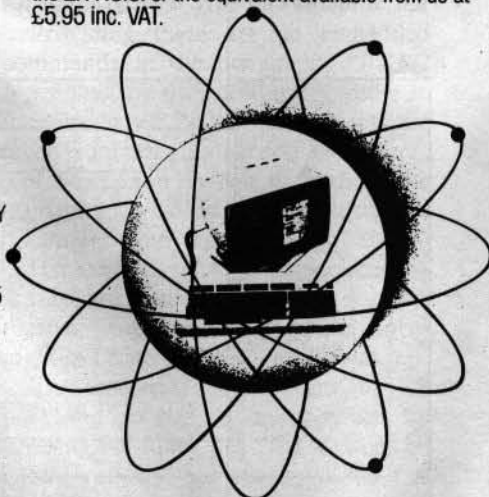
2 PRINTER INTERFACE 2
Centronics Interface for Jupiter Ace. £39.95 including VAT and Software.
Same unit as the Spectrum Interface but with adapter card.

3 PERIPHERAL INTERFACE 3 — ZX ACE
Package Using the adapter card and the Software supplied, the Sinclair ZX Printer can be connected to the Jupiter Ace. Special Introductory Offer £9.95 inc VAT.

4 PERIPHERAL INTERFACE 4

ZX BBC Adapter £24.95 inc. VAT.

Enables the connection of Sinclair Peripherals to the BBC Model B. First Software package included gives an amazingly cheap entry into printing on the BBC model B by allowing you to use the ZX Printer — ideal for listings. Please allow 28 days for delivery. Unit requires 1.2 Amp power supply: either the ZX P.S.U. or the equivalent available from us at £5.95 inc. VAT.



MANUFACTURERS AND DESIGNERS OF MICROCOMPUTER PERIPHERALS

9 Bonchurch Road, PORTSMOUTH, Hampshire PO4 8RY. Telephone (0705) 823825.

For International Enquiries (0705) 754160. Prestel Account No. 705-823825

NTERSPRINTERSPRINT!

Advanced Digital Systems are now able to supply the following range of printers at amazing prices.

EPSON	• FX 80 — £400	• MX 100/3 — £453
	• RX 80 — £278	• FX 100 — £532
	• RX 80 FT — £306	• TRACTOR FEED MECHANISM FOR THE FX 80 — P.O.A.
	• MX 80 T/3 — P.O.A.	
SEIKOSHA	• GP 100 A — £197	• TEC BUSINESS PRINTERS — P.O.A.
	• GP 100 VC — £206	
	• GP 250 X — £246	
	• GP 700 A (colour printer) — £399	

MANNESMAN TALLY	• MT 80 with Parallel Interface £270
	• MT 80 with Serial Interface £312

Prices include VAT

Please send me the items as ticked.

I enclose cheque/order for Total (Include £1.00 for post and packaging).

Cheques payable to Advanced Digital Systems Ltd.

Centronics Base Unit for Sinclair Spectrum	£34.50 inc. VAT & Software	☐
Jupiter Ace Version Base Unit and Adaptor	£39.95 inc. VAT & Software	☐
ZX Ace Adaptor and Software	£9.95 inc. VAT	☐
1.2 Amp P.S.U.	£5.95 inc. VAT	☐
ZX BBC Adapter Unit	£24.95 inc. VAT and Software	☐

EPSON	FX 80 — £400	☐	SEIKOSHA	GP 100 A — £197	☐
	RX 80 — £278	☐		GP 100 VC — £206	☐
	RX 80 FT — £306	☐		GP 250 X — £246	☐
	MX 100/3 — £453	☐		GP 700 A (colour printer)	☐
	FX 100 — £532	☐		— £399	☐

MANNESMAN TALLY	MT 80 with Parallel Interface	£270	☐
	MT 80 with Serial Interface	£312	☐

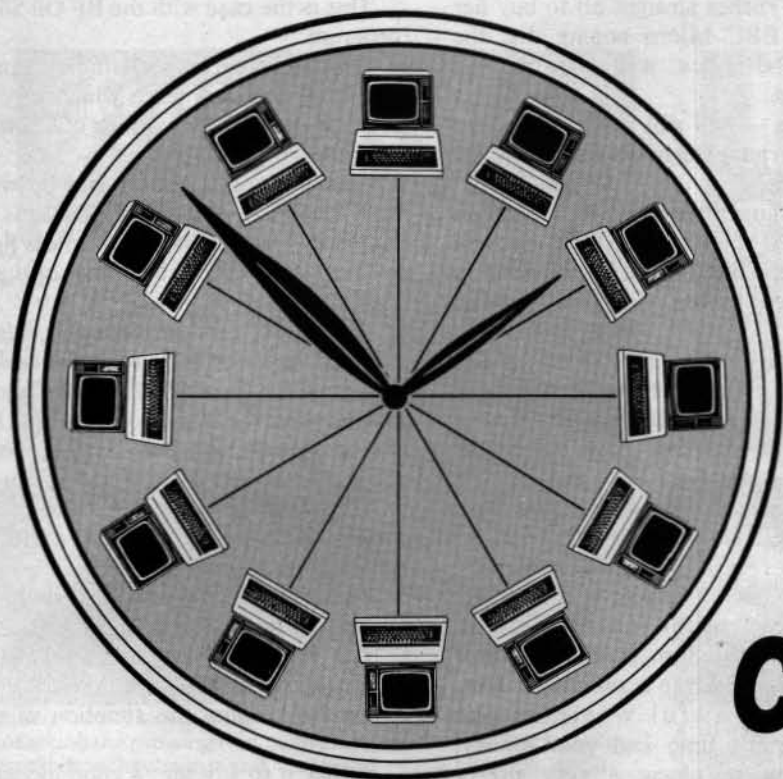
PRINTERS — Inc. VAT & Delivery

Name

Address

Send order to ADVANCED DIGITAL SYSTEMS LTD., 9 Bonchurch Road, Portsmouth, Hampshire PO4 8RY.

Advanced Digital Systems Ltd.



Economical answer to time shared CAL in school

By **TONY CRAVEN**

WE had a problem with our computers. How do you organise the use of ten BBC Micros in a sixth form college so as to give everyone as much time as you possibly can?

Some students knew more than any teacher, some had never seen a keyboard before.

Nine computers were tape based, one was a disc machine with a single sided 100k drive. The timetable demanded 40 minute slots.

We had a reasonable software library, something for everyone. Computer Studies groups were forever writing programs and wanting them saved until the following day, when they would drop in at lunchtime with 20 minutes to spare.

And those cheap tape recorders! Would they work reliably? You tell me!

I had to do something to sort out the fights for who got the disc machine. Fortunately, while browsing through the User Guide one day I came across the FX calls which direct data to the RS423 port, that middle DIN socket on the back of the BBC Micro.

Paul Beverley's article in the October edition of *The Micro User* about wiring

up the RS port helped greatly, and within a couple of days we had a simple network running where each of the nine TFS (tape filing system) machines were loading from and saving to the one DFS micro.

Not very fast, but at 10k in about 10 seconds who is grumbling?

Now we don't use tape recorders at all. Students can save a program at the

very end of a class, confident that it will be there tomorrow, when they can pop in with that quick amendment.

Classes can book the computer room for 40 minutes knowing that 39 of those minutes can actually be spent using the Computer Assisted Learning programs.

All for the price of a few five pin Domino DIN plugs, a multi wafer rotary selector switch and some scrap

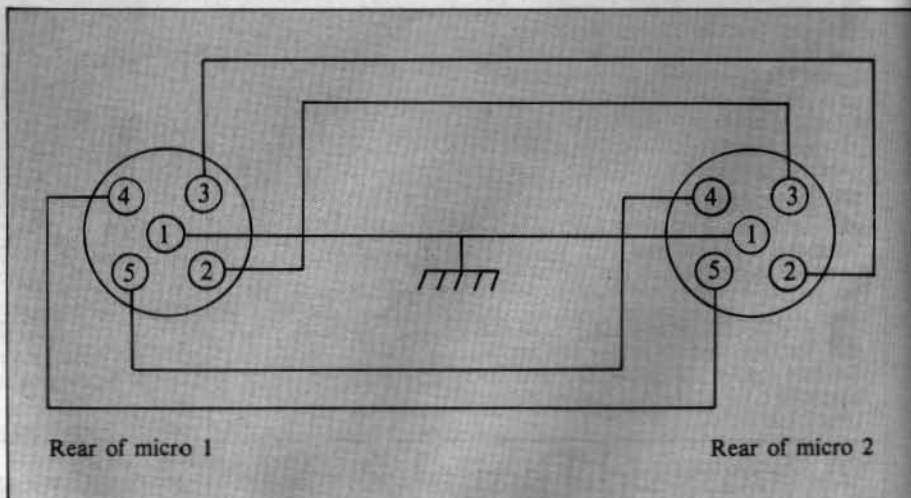


Figure 1: Connections between two BBC RS 423 ports

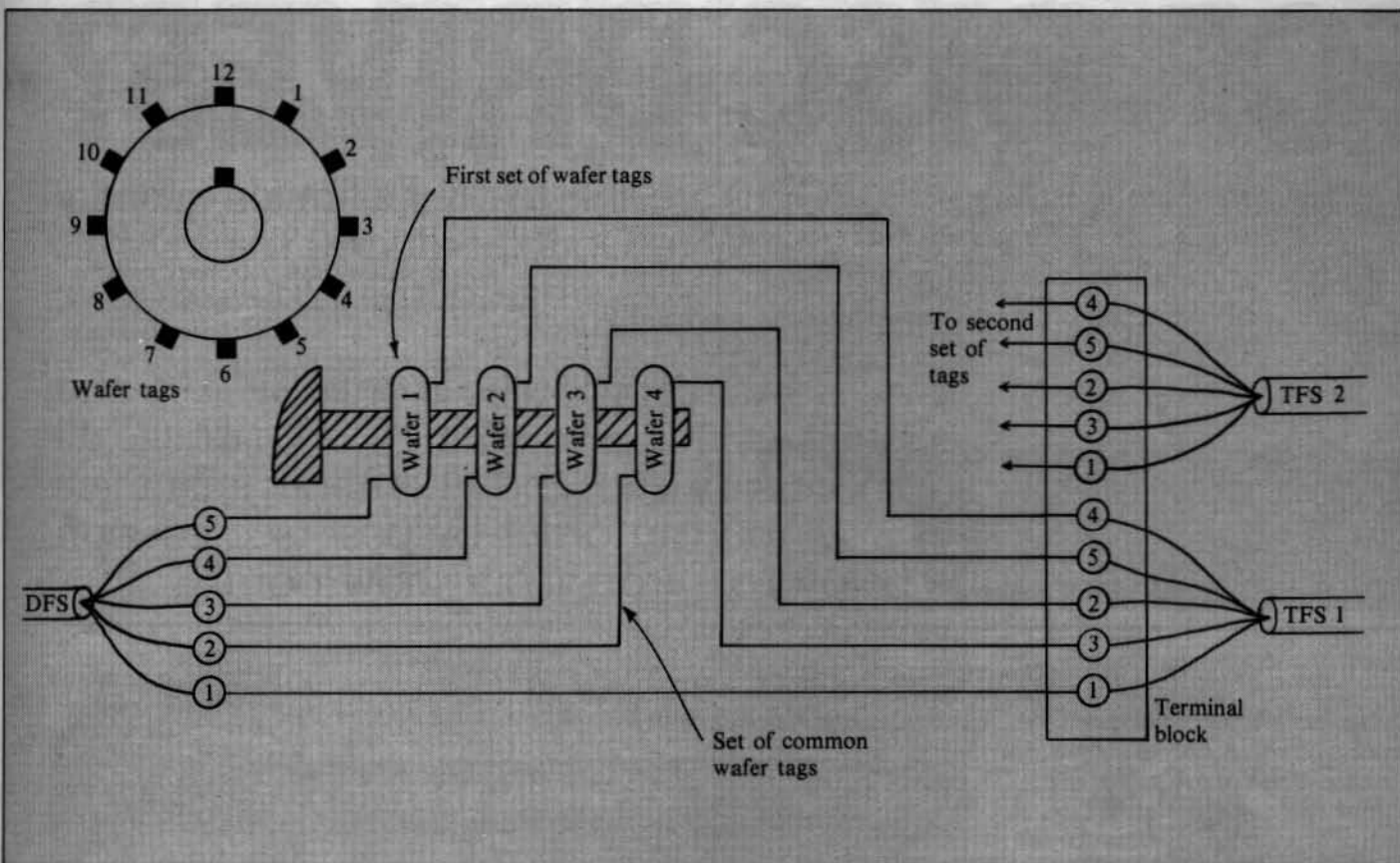


Figure II: Rotary wafer

five core cable that fell off the back of a telephone engineer's lorry.

Figure I shows the wiring necessary from the DFS micro to any number of TFS machines. I took the wires through a 12 position, four way selector switch, as shown in Figure II.

The software is very simple being contained in function keys. Each disc contains the program given in Listing I.

This program is CHAINED into the disc micro and then each TFS micro must be forced to listen to its RS port by typing in *FX2,1 followed by Return.

The particular TFS machine is selected on the rotary switch and f9 on the DFS is pressed.

This configures the function keys on the TFS machine so that f0 makes it listen to the network and f1 transmits its current program listing to the DFS, provided the DFS has been forced to listen by having its f0 pressed.

This configuration need only be done at the beginning of each day. After that single function key presses will suffice.

The students have taken to the system very easily. All they need to do is to place the right disc in the drive, select their micro number on the rotary

switch, press f1 on their micro, f0 on the disc machine and they're off.

Saving is an equally easy process, and we have one disc dedicated per group. Everybody in that group saves their work one after the other on the same disc.

I have recently also found that simple Wordwise files can be sent over this network.

Providing there are no embedded commands in the document, *FX5,2 typed into the transmitting computer in the menu mode, *FX2,1 entered into the receiving computer followed by Escape, and then option six from the menu of the transmitter will dump the formatted document from one to the other.

Here the RS port is being selected as the printer for the transmitter – the receiver simply thinks that the document is being typed in, very quickly.

The receiver is locked onto its RS port and so has to be unlocked by pressing the Break key. The text can be recovered by answering Y to the old/new text prompt that occurs after a Wordwise break.

If you have more than three BBC Micros with one DFS, then rigging up

this network is well worth doing.

The hands-on time is increased dramatically and it is also really viable to have a fast change over for CAL groups.

I know that Econet can knock this network into a cocked hat, but this one costs virtually nothing. What's more, it works now.

```
10*KEY0*FX3,7:ML:IMP.*FX2,0*IN*
FX3,4:IM
20*KEY1*FX2,1:IM
30*KEY9*FX3,7:ML:IMP.*RUN*IMP.*
FX2,0*IN*FX3,4:IM

f0 = transmit current listing
f1 = listen to RS423 port
f9 = configure the function keys
on the TFS that has been forced
to listen.
```

Listing I

By the way, ignore any syntax error reports. It works!

Tony Craven is Microelectronics Co-ordinator at Shena Simon College, Manchester.

£180: A RECORD FOR DISC DRIVES?



Opus are able to offer a limited quantity of 5 1/4" Slimline Double Sided 40 Track Drives. Formatted single density 200K., double density 400K.

And record value at only £179.95 and that includes everything – VAT, carriage, all necessary leads and a 12 month guarantee.

You can order by post (see coupon below) or direct at our showroom.



OPUS 3" MICRODRIVE. [Also available from W.H. Smith]

Double Sided 40 Track Drive 1/2 Megabyte Unformatted.

- Twice the capacity on line of other available drives
- 200K. Single Density – 400K. Double Density
- Ex-stock delivery
- 3 ms. access time
- Lowest power consumption – direct drive
- Includes case, leads and utilities disc
- Totally compatible with 5 1/4" drives

Single Drive **£229.95.** Dual Drive **£459.95.**



5 1/4" JAPANESE DISC DRIVES.

SINGLE DRIVE. [5401, 5402 available from Spectrum]

Opus 5401 Single Sided 40 Track – 250K.

Unformatted. Formatted: 100K. Single Density, 200K. Double Density. **£179.95**

Opus 5402 Double Sided 40 Track – 500K.

Unformatted. Formatted: 200K. Single Density, 400K. Double Density. **£229.95**

Opus 5802 Double Sided 80 Track – 1 Megabyte

Unformatted. Formatted: 400K. Single Density, 800K. Double Density. **£299.95**

Switchable 80/40 Track.

- 1/2 Height
- Includes case, leads and utilities disc
- Fast access time
- State of the Art Technology
- Ex-stock delivery
- Low power consumption

DUAL DRIVES.

All Dual Drives are metal cased with separate power supply.

Opus Dual 5401D. Single Sided 40 Track. 200K./400K. on line. **£379.50**

Opus Dual 5402D. Doubled Sided 40 Track. 400K./800K. on line. **£459.95**

Opus Dual 5802D. Double Sided 80 Track. 800K./1.6 Megabyte on line. **£599.95**



PRINTERS.

EPSON FX 80 F/T. **£410**
 EPSON FX 100. **£549**
 EPSON RX 80 F/T. **£315**
 JUKI 6100 Daisywheel. **£435**
 Parallel printer leads to BBC. **£12**

MONITORS.

12" Green Screen. **£89.95**
 12" Amber Screen. **£99.95**
 Lead to connect to BBC Micro. **£3.95**
 • Ex-stock delivery • 24 MHz Bandwidth • Limited quantity
 14" JVC Colour Monitor – Med. Res. **£187.39**
 14" JVC Colour Monitor – High Res. **£279.39**

THE ORGANISER DESK.

- Top shelf for Monitor/Printer
- Large Desk Top Area
- Lower Shelf for Paper/Book Storage
- Teak Finish
- On Castors
- Self Assembly
- Ample room in front of the shelf for you to sit comfortably.

Only **£59.95**



FLOPPY DISCS.

3" Cartridges **£5.75** each or **£25.95** for 5.

5 1/4" Discs – with full 5 year warranty + free plastic library case.

S/S S/D **£19.95** for 10

S/S D/D **£23.95** for 10

D/S D/D **£26.95** for 10

S/S 80 Track **£29.00** for 10

D/S 80 Track **£31.95** for 10

8" Discs.

S/S S/D **£21.50.**

S/S D/D **£28.50.**

D/S D/D **£29.95.**

Double Density disc filing system for BBC Micro

£99.95

GOVERNMENT & EDUCATION DISCOUNTS GIVEN.

QUANTITY DISCOUNTS GIVEN. DEALER ENQUIRIES INVITED.

OPUS SUPPLIES LTD.

158 Camberwell Road, London SE5 0EE.

Opening hours: 9.00-6.00 Monday-Friday,

9.00-1.30 p.m. Saturday.

01-701 8668
 01-703 6155

STOP PRESS.

Phone us for latest dealer price list.

ALL ITEMS ARE GUARANTEED FOR 12 MONTHS AND ARE SUITABLE FOR USE WITH BBC AND OTHER LEADING MICROS.

To: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Please rush me the following: **(ALL PRICES INCLUDE VAT & CARRIAGE.)**

Quantity	Description	Price

I enclose a cheque for £. TOTAL

Or please debit my credit card account with the amount of £.

My Access/Barclaycard (please tick) No. is

Name

Address

Telephone

Opus.
 Opus Supplies Ltd.

The chips are down!

— and you can WIN
eight of them, plus
the latest ROMboard

WIN £300 worth of ROM based software and the ROMboard to put them on in this month's easy to enter competition.

The lucky winner of the competition will receive the following eight ROMs:

- A. Beeb Printer ROM — the machine code printer utility.
- B. Wordwise — the incredibly successful word processor from Computer Concepts.
- C. Disc Doctor — the sophisticated disc utility ROM.
- D. Beebfont — the ROM that allows you to define your own character sets and print them out on an Epson printer.
- E. Beebmon — the ROM based machine

code monitor which allows assembly language programs to be debugged and altered easily and quickly.

- F. Dump ROM — will dump all screen modes to an Epson printer. Handles

teletext graphics and double height characters.

- G. Disassembler ROM — Watford's latest release.

- H. The Watford DFS — claimed to be the most sophisticated DFS software yet written for the BBC Micro.

And there's also the new version of the Watford ROMboard to put them on!

All you have to do to win the lot is to list the eight ROMs in their order of usefulness to the average user.

Then, as a tiebreaker, tell us, in not more than 25 words, the piece of software that you would most like to see on ROM.

Send your entry, on the coupon below, to reach us no later than March 29, 1984.

DECEMBER CONTEST WINNERS

THE prize for our December competition — three complete Micronet systems — inspired many hundreds of readers to enter.

They had to describe the best use for an old 0.1 OS ROM. And their imaginations ran riot.

Sorting through the entries was a mammoth task but we eventually found three winners whose entries we give below:

- **Sindy Old 0.1 ROM toast rack** (see picture) — Sam and Wendy Farr, Combe Haybath.

- **For testing neurological function.** Placed on the patient's chair, the

ROM detects ability to discriminate between 28 simultaneous stimuli. If positive, the investigation indicates hysteria. — **Dr B. Bedford, Brockenhurst.**

- **To be issued to all those customers who are still waiting for a second processor, so that they can have a chip on both shoulders.** — **R.C. Todd, Royston.**



WATFORD
ELECTRONICS
13 ROM BOARD
FOR BBC MICRO

Your FREE entry form

List the eight ROMs mentioned above in order of their usefulness to the average user. For example, if you think that a Beeb Printer ROM would be the most useful, put A in box 1, and so on.

Then in not more than 25 words complete the following sentence:

1 ☐	5 ☐	The piece of software I would most like to see on ROM is ... _____
2 ☐	6 ☐	
3 ☐	7 ☐	
4 ☐	8 ☐	

Name _____ Address _____

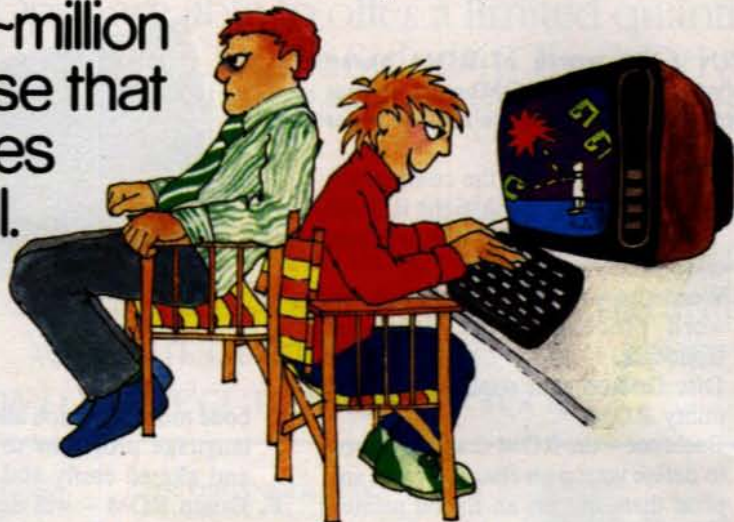
Tel. No. _____

POST TO: ROMboard Contest, *Micro User*, Europa House,
68 Chester Road, Hazel Grove, Stockport, SK7 5NY



There must be more to a micro than zapping monsters

See how much more when you plug into Micronet 800—a multi-million pound database that lets you play games as well.



Micronet 800 helps your micro come of age

It is the sophisticated network that many popular makes of micro can plug into via the telephone, giving home micro users new horizons to use and explore.

Micronet 800 lets you communicate through your micro...

...By linking you into a network of thousands of micro users who always have something new to say to each other. Through *Letters to the Editor*, *Clubspot* (for computer user groups), *Swapshop* (our electronic bulletin board) and electronic *Mailbox*, Micronet keeps you in touch with other people who want to do more with computers than just play games.

Micronet delivers to your micro our electronic newspaper and PRESTEL

Newsflashes give you news and reviews on new equipment, software and computer applications. A *Microbase* dedicated to your type of micro contains technical hints and tips. You also have access to other facilities on *Prestel*: Homebanking with *Homelink*, world and business news, teleshopping and much more.

Micronet 800 gives you software

Offering you some of the best software bargains around. Through your phone line and straight into your computer. Scores of educational and utility programs are included. And a wide range of terrific games software. Many of which are completely free and constantly changing every few weeks – just in case you want to take another zap at those monsters again.



Systems Innovation of the year

Please send me the full facts about Micronet 800. Not forgetting the games!

Name

Make/Model of Micro

Address

Telephone

MICRONET 800, Scriptor Court,
155 Farringdon Road, London EC1R 3AD

BBC3



MICRONET 800, Scriptor Court, 155 Farringdon Road,
London EC1R 3AD. Telephone: 01-278 3143.

It's enough to blow the mind of any micro!



One of the many faces on Prestel

© Prestel and the Prestel symbol are trademarks of British Telecommunications

DENARY Derrick is designed to help young children to get practice with numbers, and in so doing, get used to a computer keyboard.

The program will play two games. The first requires the defender to fire rockets by pressing the key which has the same number as Derrick is carrying.

Once the correct key is depressed a rocket is launched, and can be guided by the Left and Right keys.

It is not very difficult to hit Derrick once the rocket is fired. The aim of the game is to stop him, but the essential tactic is to get the correct number.

Once the first game is mastered the major role of Derrick can be used. In the system of counting we use 10 is very important. The columns in base 10 (denary), represent units, tens of units, tens of tens, and so on.

It can be seen that relating numbers to 10 is very important. The numerical difference between a number and 10 is fundamental in subtraction, and thus in many more complex calculations. This is where Denary Derrick comes in.

The second game is almost identical to the first but rockets are only launched if the key representing the difference between Derrick's number and 10 is pressed.

For example, if Derrick has a 1 the rocket will only be fired if 9 is pressed.

If Derrick is hit he is merely teleported back to the top of the screen where he will collect a different number. A hit scores 10 points.

When Derrick lands for the third time a score card is displayed showing the last score and the total overall. The program then returns to the rule sheet and the player can reselect game one or two.

The program itself has a simple structure. PROCintro gives the idea of the game while PROCdefine sets up tables of data and defines characters.

Then there are three nested REPEAT loops. The outermost, a continuous loop, will rerun the game until BREAK or ESCAPE is pressed.

The second loop allows game one or two to be selected before each go, ending when Derrick has landed for his third time.

Inside this is a loop which keeps Derrick moving down until he is hit or has landed.

PROCbase checks to make sure the launch pad can be moved, and if so prints it in its new position.

Similarly PROCspider does the

The count down is on!

By KIM WEST and PAUL PASSANT

same for Derrick (note line 400 - VDU48+N% is used to print the required figure on Derrick).

FNhit acts as a shield around Derrick, checking if the rocket has reached him.

All the machine code for printing Derrick is assembled in PROCdefine along with all the data and characters.

To ensure Derrick carries different numbers on subsequent descents PROCinit sets NI% to the old value of N% (Derrick's number), and picks random values of N% until it is different to NI%.

KEY% is the Ascii value of the number which should be pressed. Lines 1530 and 1540 calculate KEY% depending on which version of the game is being played.

Several colours are changed with VDU19, the flash rate increased so Derrick's eyes move faster, and printing is sent to the graphics cursor ready to print Derrick.

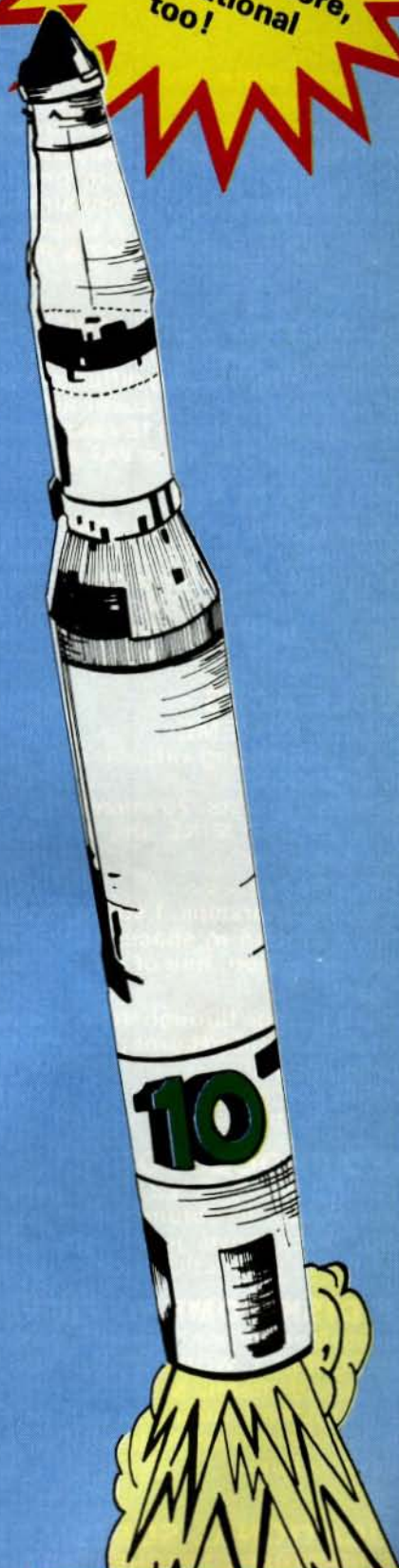
PROCupdate briefly returns printing to the text cursor and prints the score.

On landing all colours are changed to blue except one for the printing. PROCland also plays a tune and then resets the colours ready for the next descent.

PROCanother gives the sheet, last score and running total. Finally PROCexplode teleports Derrick with the aid of some interesting machine code which fragments his part of the screen. Denary Derrick is a long listing, but a very educational program for youngsters.

And don't forget, if you haven't the time to type in the listing it is available on tape along with all the other programs in this month's *Micro User*.

We have lift-off with this fascinating game for children - and what's more, it's educational too!



FULL LISTING STARTS ON PAGE 163

YOU HAVEN'T SEEN ANYTHING LIKE THIS ON A COLOUR MONITOR BEFORE.

An RGB monitor from JVC offering a resolution of 370 x 470 pixels for less than £150?

We guarantee you won't see another bargain like that in this or any other micro mag—or in any other supplier's showroom.

For we've managed to acquire the sole distribution rights to these superb machines and we are able to offer them at an unbeatable price.

There are two models available: medium resolution (370 x 470 pixels) at £149.95; and high resolution (580 x 470 pixels) at £229.95. (Both excluding VAT.)

The units have a 14" screen and are suitable for the BBC Micro, Lynx, Oric, Apple, and most other leading micros.

They are robustly constructed in a handsome cream casing. And come with a full year's guarantee.

Delivery is good: your monitor should arrive by courier service within ten days of our receiving your order.

You can order by filling in the coupon below and posting to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or by telephoning 01-701 8668 quoting your credit card number. Or, of course, you can buy in person at our showroom between 9am-6pm Monday-Friday, 9am-1.30pm Saturday.

MODEL REFERENCE	1302-1 Medium Resolution	1302-2 High Resolution
RESOLUTION	370 x 470 Pixels	580 x 470 Pixels
C.R.T.	14"	14"
SUPPLY	220/240v. 50/60Hz.	220/240v. 50/60Hz.
E.H.T.	Minimum 19.5kv Maximum 22.5kv	Minimum 19.5kv Maximum 22.5kv
VIDEO BAND WIDTH	6MHz.	10MHz.
DISPLAY	80 characters by 25 lines	80 characters by 25 lines
SLOT PITCH	0.63mm	0.41mm
INPUT: VIDEO	R.G.B. Analogue/ TTL Input	R.G.B. Analogue/ TTL Input
SYNC	Separate Sync on R.G.B. Positive or Negative	Separate Sync on R.G.B. Positive or Negative
EXTERNAL CONTROLS	On/off switch and brightness control	On/off switch and brightness control



To Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE.

Please send me _____ Medium Resolution Colour Monitor(s)
at £149.95 each (ex. VAT).

_____ High Resolution Colour Monitor(s) at
£229.95 each (ex. VAT).

_____ Connection lead(s) at £6.00 each.

I understand carriage per monitor will cost an extra £7.00.

(N.B. A Medium Resolution Monitor including VAT, lead, and carriage costs £187.39. A High Resolution Monitor including VAT, lead, and carriage costs £279.39.)

I enclose a cheque for £_____. Or please debit my credit card
account with the amount of £_____. My Access/Barclaycard
(please tick) no. is _____

Please state the make of your computer _____

Name _____

Address _____

Telephone: _____

Opus.
Opus Supplies Ltd.

BUB

LORDS OF TIME

Joins our range of acclaimed pure-text puzzle adventures, at £9.90, for:

BBC 32K **COMMODORE 64** **SPECTRUM** 48K **LYNX** 48K **NASCOM** 32K **ORIC** 48K **ATARI** 32K

ADVENTURE REVIEWS

"Adventures which have a fast response time, are spectacular in the amount of detail and number of locations, and are available to cassette owners... I am extremely impressed... The Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Cave (Adventure) is nothing short of brilliant; rush out and buy it. While you're at it, buy their others too. Simply smashing!"

—SOFT, Sept 83

"I found Dungeon exceedingly well planned and written, with a fast response. There are well over 200 locations and the descriptions are both lengthy and interesting. The objects number about 100. It could therefore take some months to explore the whole network, giving many hours of enjoyment in the process."

—C&VG, Sept 83

"The descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine... great fun to play."

—Which Micro?, Aug 83

"My appetite has been whetted and I intend to get my own copy (of Snowball) to play."

—What Micro?, Dec 83

ADVENTURE REVIEWS

"This has to be the bargain of the year. If adventures are your game then this (Colossal Adventure) is your adventure."

—HCW, 5 Sept 83

"Colossal Adventure is simply superb. Anyone who wishes to use adventures in an educational setting really must use and see this program as it emulates Crowther and Wood's masterpiece so well. For those who wish to move onto another adventure of similar high quality, Dungeon Adventure is to be recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"

—Educational Computing, Nov 83

Colossal Adventure is included in Practical Computing's Top 10 games choice: "Poetic, moving and tough as hell."

—PC, Dec 83

"To sum up, Adventure Quest is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you"

—NILUG #1.3

"Colossal Adventure... For once here's a program that lives up to its name... a masterful feat. Thoroughly recommended"

—Computer Choice, Dec 83

"wholly admirable"

—Your Computer, Sept 83



MIDDLE EARTH ADVENTURES

1: COLOSSAL ADVENTURE

A complete, full size version of the classic mainframe game "Adventure" with 70 bonus locations added.

2: ADVENTURE QUEST

Centuries have passed since the time of Colossal Adventure and evil armies have invaded The Land. The way is long and dangerous; but with cunning you can overcome all obstacles on the way to the Black Tower, source of their demonic power, and destroy it.

3: DUNGEON ADVENTURE

The trilogy is completed by this superb adventure, set in the Dungeons beneath the shattered Black Tower. A sense of humour is essential!

THE FIRST SILICON DREAM ADVENTURE

1: SNOWBALL

The first of Pete Austin's second trilogy. The giant colony starship, Snowball 9, has been sabotaged and is heading for the sun in this massive game with 7000 locations.

THE LORDS OF TIME SAGA

7: LORDS OF TIME

Our congratulations to Sue Gazzard for her super design for this new time travel adventure through the ages of world history. Chill to the Ice-age, go romin' with Caesar's legions, shed light on the Dark Ages etc. etc. We'll be selling this game mail-order from January 1st.

Price: £9.90 each (inclusive)

Level 9 adventures are available from good computer shops, or mail-order from us at no extra charge. Please send order, or SAE for catalogue, to:

LEVEL 9 COMPUTING

Dept U, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

Please describe your Computer

MARTIAN ATTACK

A SUPERB
NEW B.B.C.
PROGRAM
FROM BRITAIN'S
LEADING SOFTWARE
HOUSE!

(B.B.C. MODEL B or 32k MODEL A with VIA) 1.2 OS only.

ONLY £7.95

Command the solitary laser post to defend the domed city against the onslaught of the Zargon fleet. Sweep the skies above the Red Planet, line the alien craft in the centre of the sights and unleash the devastating power of the neutron cannons. Switch on the city's forcefield as a last resort to deflect the barrage of enemy shells.

Smooth-scrolling graphics and devastating sound effects feature in an excellent arcade quality machine-code game.



WE STOCK THE BBC MICRO, ELECTRON, DRAGON 32, COMMODORE 64, ORIC AND SPECTRUM.

SPECIAL OFFER

Deduct £1 per cassette when ordering two or more

All cassettes are fully guaranteed and contain two recordings. All prices inclusive of VAT.

Mail Order: Please add 55p per order to cover P & P.

WE'RE EXPANDING!

Showroom:
Northwood House
North Street
Sheepscar
Leeds LS7 2AA
Tel: (0532) 458800

Mail order:
Dept.
8/8a Regent Street
Chapel Allerton
Leeds LS7 4PE
Tel: (0532) 683186/696343

WRITTEN ANY PROGRAMS? WE PAY 20% ROYALTIES



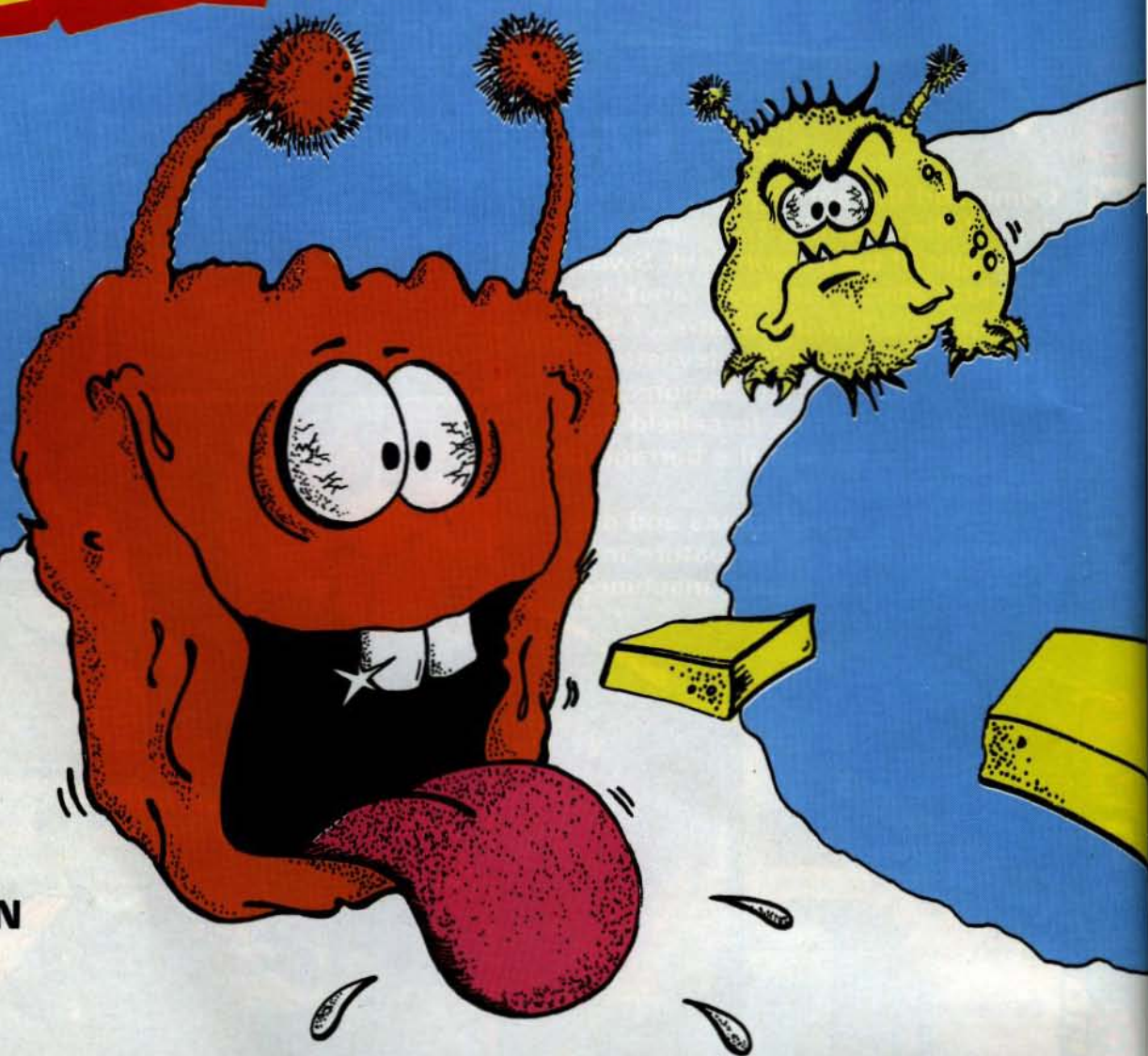
WE Guarantee THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

The following titles are available for both the BBC Micro and Electron: Killer Gorilla £7.95/ Moonraider £7.95/Bandits at 3 o'Clock £6.95/ Croaker £7.95/Felix in the Factory £7.95/ Felix and the Fruit Monsters £7.95/Chess £7.95/ Escape from Moonbase Alpha £7.95/Draw £9.95/ Swoop £7.95/Cybertron Mission £7.95.

BBC only (at present): Demon Decorator £6.95/ Galactic Commander £7.95/Time Trek £7.95/ Asteroid Storm £7.95/Laser Command £7.95/ Alien Swirl £6.95/Labyrinths of LaCoshe £7.95/ Filer £9.95/Cowboy Shootout £6.95/Well £5.95/ Chemistry £6.95/Beebmon £7.95/Barrage £7.95/ Adventure £7.95/Caveman Adventure £6.95/ Danger! UXB £7.95/World Geography £8.95/ Where? £6.95/Junior Maths Pack £6.95/ Constellation £6.95/Physics £6.95.

BBC MICRO AND ELECTRON PROGRAMS CAN BE OBTAINED FROM SELECTED BRANCHES OF W.H. SMITH, JOHN MENZIES, BOOTS, HARRODS, ALL GOOD MICRO DEALERS, OR DIRECT FROM POWER.

MAZEM



By **SIMON PHIPPS**

AT the beginning of the year 1984 a mad 17-year-old computer genius (huh!) produced nightmarish mutant creatures by disassembling the darkest recesses of his 1.2 MOS.

These creatures, obsessed with the task of chasing anything that moved, soon took over his BBC Micro and placed nasty bugs in exactly the wrong parts of the program.

The creatures, designated under the code name of Goojgies, ran riot and after a year of feverish work on school micros and programmable calculators, this whizz kid created a solution to the problem... the Munchers!

Operating under manual control, the Munchers were sent out to clear the

bug-ridden logic mazes of Bits – small binary digits that would cause the terrifying Bad Program error if ever introduced in the wrong addresses.

To the assistance of our fearless pink heroes came the Nibbles – powerful bits that when eaten sent the Goojgies into fits of terror and while active, allowed the Munchers to devour these unsavoury creatures and temporarily stopped their evil doings.

Soon rogue graphics characters in the form of strawberries, birds, cherries, keys, bells and plums helped nourish the Munchers. But after a tough fight the graphics left and now my MOS is completely free of any problems.

Just to make certain that your BBC

or Electron doesn't have any of these nightmarish fiends, start typing. Or better still, send for the cassette version – you never know when you will have trouble with your Goojgies!

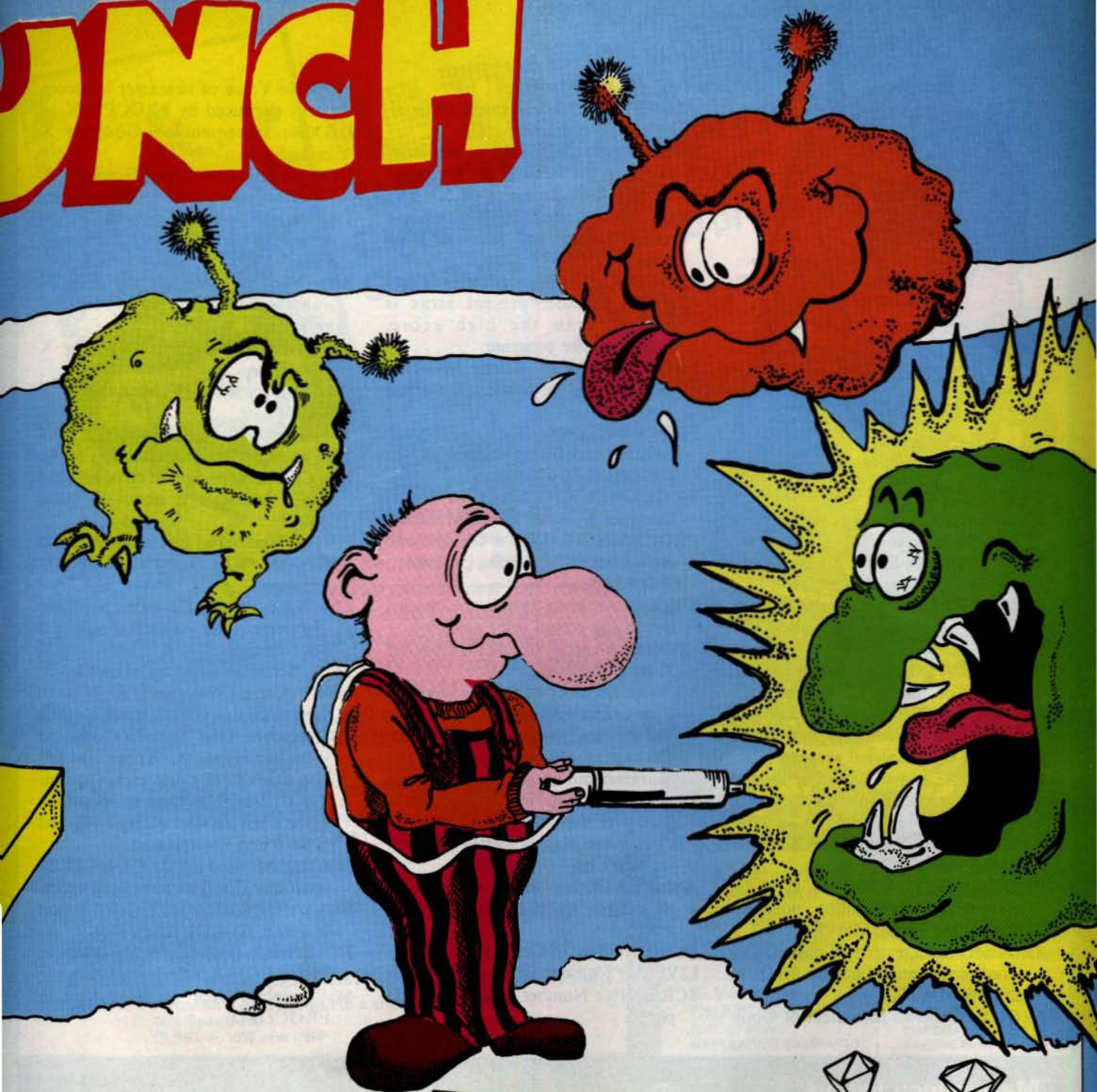
In case you didn't recognise it from the foregoing, the game is quite simply a version of a classic arcade game. For those of you who have never played it before, here's a short summary.

The object is to move the pink Muncher around the screen, eating the dots and bonus fruits.

To make things more difficult you are pursued by two evil monsters who kill on contact.

If one of the flashing Nibbles is eaten (there are four, one at each corner of the

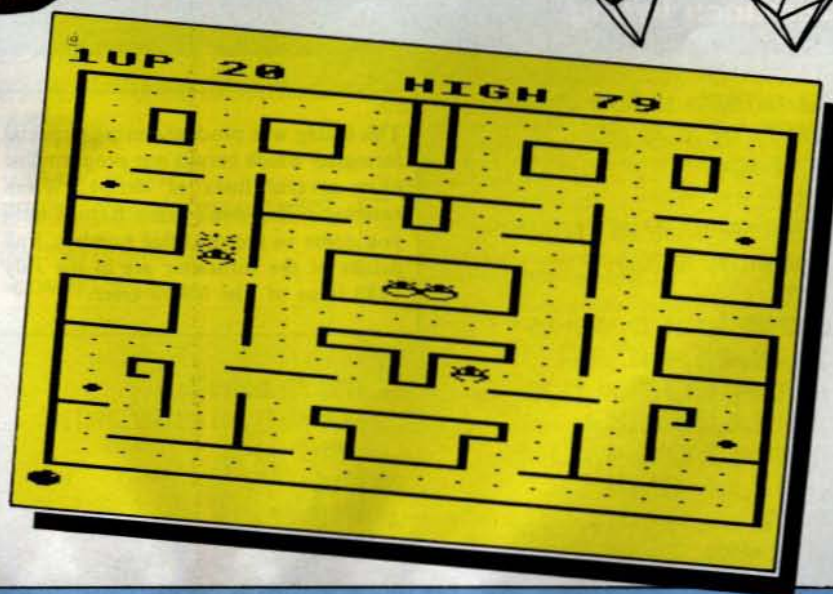
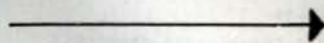
PUNCH



screen) then, for a limited time after, the Muncher may chase the offending Goojgies around the screen and extra points are gained for eating them while they are flashing.

Completion of a whole screen gives a new screen with faster Goojgies and more chances for the Muncher to get indigestion.

Controls: A to move up, Z to move down and cursor left and right for the appropriate direction.





From Page 65

PROCEDURES:

PROCCHARS: Defines characters 224-255 for game.

PROCSCREEN: Draws the maze and sets up the score display.

PROCINIT: Defines the strings for the fruit, positions of Muncher and Goojies.

PROC MEN: Prints out the appropriate number of lines in the central box.

PROCSCREENCOUNT: Prints out the number of fruit representing the number of completed screens.

PROC MAN: Moves Muncher around the screen making appropriate checks.

PROC FRUIT: Prints out bonus fruit on the screen.

PROC GHOST: Controls Goojie movement, incrementing positions and calling PROC MOVE.

PROC MOVE: Designates direction of Goojie movement calling PROC X and PROC Y.

PROC X: Controls increment of Goojie's X co-ordinate.

PROC Y: Controls increment of Goojie's Y co-ordinate.

PROC PEEK: Checks the screen array to return the value of the character the Goojie is to move onto.

PROC DIE: Kills the Muncher and resets Goojie and Muncher positions.

PROC DEED: Displays 'game over' and checks whether present score is greater than the high score, re-running the program.

PROC REPLACE: Resets Muncher and Goojie positions to starting positions.

PROC COLOURS: Flashes through colours redefining colour 4 for completion of a screen.

PROC CHECK: Checks to see if Goojies are eaten by the Muncher.

PROC MUNCH: Eats a Goojie and replaces it to its starting position.

VARIABLES:

A%(x,y): An array storing the characters at the screen print positions.

GX%(n): An array storing the Goojies X co-ordinate values.

GY%(n): An array storing the Goojies Y co-ordinate values.

OG%(n): An array storing which character was present on the character cell upon which a Goojie now stands, allowing the Goojies to pass over the dots without blanking them out or placing them where they shouldn't be.

AS%(n): A string array storing the characters that make up the bonus fruit.

NG%: Number of Goojies on screen.

LIVES%: Number of lives left.

SCREEN%: Number of screens completed.

PEEK%: Value of character in screen array produced by PROC PEEK.

DGX%: Increment on Goojies X co-ordinate.

DGY%: Increment on Goojies Y co-ordinate.

T%: Variable controlling which Goojie is to be moved during one game cycle.

A%: Variable returning the INKEY value of the key pressed for Muncher movement.

P%: Increment on Muncher's X co-ordinate.

Q%: Increment on Muncher's Y co-ordinate.

X%: Muncher's X co-ordinate.

Y%: Muncher's Y co-ordinate.

L%: Character present in error array to which Muncher is about to move onto.

EAT%: Number of bits (dots) eaten. If EAT% > 212 a new screen is generated.

C%: Variable swing present Muncher character - that is, whether mouth is open or closed.

SC%: Score obtained by Muncher.

H%: Before the program is RUN set to zero since this holds the value of the high score. Line 20 checks for a -ve value just in case this is neglected and H% exists from a previous program.

A,X,Y,C: Variables used to set up the maze when the data on lines 410-660 is read and manipulated.

J%: Variable used in PROC CHECK to see if any Goojies have been eaten.

F: Variable used in FOR-NEXT loop in PROC COLOURS.

J: Variable used as delay loop in PROC COLOURS.

M: Variables used as delay loop in PROC DEED.

Mazemunch listing

```

10 REM MAZEMUNCH by Simon Phipps
15 REM (C) THE MICRO USER
20 IF HX<OHX=0
25 CLS
:PRINT TAB(0,16)*"INITIALISING"
:FOR WAIT=1 TO 2000
:NEXT
30 ENVELOPE 3,1,10,20,-30,10,5
,15,127,-2,0,-1,127,100
:ENVELOPE 1,1,1,34,86,25,25
,40,126,0,0,-126,125,0
:ENVELOPE 2,1,-16,-6,1,10,45
,60,127,0,0,-127,126,0
40 MODE 2
:TIME =6000

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```

:VDU 23;8202;0;0;0;
:DIM AX(19,26),GX(2),GY(2)
,OG(2),A$(5)
50 *FX4,1
60 *FX11,1
70 *FX12,1

```

```

80 ON ERROR GOTO 1040
90 PROCCHARS
:PROCSCREEN
:PROCINIT
:PROC MEN
:PROCSCREENCOUNT
:REPEAT
:FOR SZ=0 TO 12-SCREENX
:PROC MAN
:NEXT
:IF RND(200)<10 PROC FRUIT
ELSE IF RND(200)<10 AX(10,10)=32
:PRINT TAB(10,10);" "

```

Turn to Page 151



BE THE WAR LORD

RUN CITIES, COUNTRIES, CONTINENTS- BUT, BE WARNED!

Someone is about to press the button for

Apocalypse

A GAME OF STRATEGY

REDSHIFT HAS MADE THE WORLD OF WAR GAMES ORIENTATED COMPUTER GAMES ITS OWN"
P.C.W. - 24/30 NOV 83
ISSUE

The leading game (APOCALYPSE) has four different maps, on any one of which you may fight your war (see section A.). An additional tape which contains a further six maps may also be added to expand your atlas (see section B.). Alternatively, you can be NERO in the FALL OF ROME or Napoleon's right-hand man in NAPOLEON'S CAMPAIGN in 1813 (see section C.). Can you survive the War of 1984 or could you lead your marines from island to island in the PACIFIC war? (see section D.).



NEW RELEASES!

- NEBULA** A masterly introduction to a strategy game!
48K Spectrum
£6.95 inc. VAT and P&P
- REBELSTAR RAIDERS** Can you survive the Rebel Star Raiders?
48K Spectrum
£9.95 inc. VAT and P&P
- FIRST EMPIRE** Your introduction to complete "Table top moderated war games"
48K Spectrum & BBC
COMING SOON

TIME LORDS Get entangled in the complexities of time travel...
COMING SOON

REDSHIFT LTD.

12c MANOR ROAD, STOKE NEWINGTON, LONDON, N16
TEL: (01) 800 1333



Apocalypse is produced under licence from The Games Workshop Ltd.

A. APOCALYPSE
For: Spectrum 48K & BBC Model B
£9.95 inc. VAT and P&P.
Available from J Menzies, Boots & Microdealer UK.

B. Volume 1: NOVAMAPS
Six New Maps!
USA ARCTIC CIRCLE
SE ASIA STAR SYSTEMS
S AFRICA NETHER EARTH

C. Volume 2: CHAPTER 1
FALL OF ROME
NAPOLEON'S CAMPAIGNS 1813

D. Volume 2: CHAPTER 2
THE 1984
PACIFIC WAR

Expansion Kits for Spectrum 48K (B, C & D only)
£4.95 each inc. VAT and P&P.

Microdrive version available by negotiation

HOW TO ORDER. You may purchase any of the items listed by cheque or postal order. All you have to do is fill in the details in the coupon enclosing your cheque/P.O. made payable to BINDEMAN Ltd. and your order will be dispatched within 7 to 14 days. All prices inclusive of VAT and P&P.

Post to: REDSHIFT LTD, 12c MANOR RD, STOKE NEWINGTON, N16.

I would like to purchase item(s):
(Please circle/tick item(s) required)

A B C D (For Apocalypse) Available for BBC/Spectrum (Delete which is not applicable)

- ☐ Nebula ☐ Rebel Star Raiders ☐ First Empire
☐ Time Lords

I enclose my cheque/P.O. for £

Name

Address

Tel (Day) Tel (Eve)

Please allow 7 to 28 days for New Releases

MU 3

(M. BULLEN, FALKLANDS, South Atlantic)

We quote reviews from all the magazines to help you decide. We tell you if your joystick will work - all programs run with keyboard control, too. We save you money by choosing the best - and we send them fast, which saves you hunting round the shops. From over 40 countries you write praising our same-day despatch. Mail order or telephone credit card orders only please. Prices quoted include U.K. VAT. For orders abroad, prices are the same. You can phone VISA or ACCESS credit card orders to us on 01-789 8546 at any time, from any country where your own regulations permit this.

68 MICRO USER March 1984

THE Editor asked me what this month's article would be about. "The sound effects channel, sir", I answered meekly.

He staggered off to a lunch time planning meeting at the Ram and Buffer and I settled down to my work. I nearly leapt out of my skin when he crept up behind me and yelled "Boo".

"So that's how sound affects you", he cackled as he dodged the User Guide.

Rocket attack? No, it's just white noise

AS I told the Editor, this month we'll be covering the sound effects channel. This is the channel you select by making the first parameter of the SOUND command equal to zero.

You'll be using lots of SOUND commands such as:

```
SOUND 0,-15,2,40
```

With channel 0 you can create all sorts of weird and wonderful effects – especially when you start to use the ENVELOPE command which we'll come to in next month's *Micro User*.

In all there are eight basic sound effects available on channel 0. You can get them by making the pitch parameter of a channel 0 command equal to a number between 0 and 7.

Type in Program I, run it and you'll get a conducted tour through the various noises. Figure I summarises the result each value of the pitch parameter has on a channel 0 SOUND command.

```
10 REM PROGRAM I
20 REPEAT
30 FOR pitch=0 TO 7
40 CLS
50 PROCnoise(pitch)
60 NEXT pitch
70 UNTIL FALSE
80 END
90 DEF PROCnoise(pitch)
100 PRINT TAB(5,5) "This is noise
number ";pitch;"."
110 IF pitch=3 OR pitch=7 THEN PRINT
TAB(5,15) "This can be varied by using"
TAB(5,17) "a sound on channel 1"
120 PRINT TAB(5,20) "Press a key for
next noise."
130 SOUND 0,-15,pitch,255
140 WAIT=GET
150 SOUND 1,0,0,0
160 ENDPROC
```

So to use the sound effects channel we use a SOUND command such as:

```
SOUND 0,-15,pitch,20
```

where pitch has a value between 0 and 7. The value you give to pitch decides what kind of sound effect you get.

As you'll see from Figure I, putting in values of 0, 1 or 2 all give something called "periodic noise".

If pitch is equal to 0 you get high frequency periodic noise. Enter:

```
SOUND 0,-15,0,40
```

and you'll see (or, rather, hear) what I mean.

As you might guess, values of pitch of 1 and 2 give medium frequency and low frequency periodic noise respectively. Try:

```
SOUND 0,-15,1,40
```

and:

```
SOUND 0,-15,2,40
```

if you don't believe me.

To hear all three in order run Program II.

```
10 REM PROGRAM II
20 FOR pitch=0 TO 2
30 SOUND 0,-15,pitch,20
40 NEXT pitch
```

This should help you hear the difference between the three.

If you want you can use a selection of periodic noises to produce something approaching a "Close Encounters" noise.

Program III does this by playing each of the periodic noises in turn over and over, the duration of each note getting less each time round the REPEAT... UNTIL loop.

```
10 REM PROGRAM III
20 time=20
30 REPEAT
40 FOR pitch=0 TO 2
50 SOUND 0,-15,pitch,time
60 NEXT pitch
70 time=time-2
80 UNTIL time=0
```

Notice that it is time and not TIME in the above program. TIME refers to the internal clock of the micro and could cause some funny results if used!

For the moment let's ignore what happens when you make the pitch equal to 3 and go straight on to what happens when you make it 4, 5, or 6.

If pitch has these values, channel 0 produces "white" noise.

If you want to know what that is then enter:

```
SOUND 0,-15,4,100
```

This will give you five seconds of high

Value of P	Noise produced on channel 0
0	High frequency periodic
1	Medium frequency periodic
2	Low frequency periodic
3	Periodic – frequency depends on pitch of channel 1
4	High frequency white
5	Medium frequency white
6	Low frequency white
7	White – frequency depends on pitch of channel 1.

Figure I: Pitch values on channel 0

More sound advice from NIGEL PETERS

From Page 69

frequency white noise. It won't come as a surprise to learn that:

```
SOUND 0,-15,5,100
```

will give you five seconds of medium frequency white noise and:

```
SOUND 0,-15,6,100
```

five seconds of low frequency white noise.

Try Program IV which plays all three one after the other for a gradually decreasing time.

It's very like Program III, so don't type it all in again. Just use the Copy key and change the lines you have to:

```
10 REM PROGRAM IV
20 time=20
30 REPEAT
40 FOR pitch= 4 TO 6
50 SOUND 0,-15,pitch,time
60 NEXT pitch
70 time=time-2
80 UNTIL time=0
```

Now what does all that white noise remind you of? A steam engine?

Try Program V. This uses the white noise pitch parameters in a REPEAT... UNTIL loop to make the sounds of an accelerating engine.

The REPEAT... UNTIL FALSE loop takes over when the engine is at full speed.

```
10 REM PROGRAM V
15 REM STEAM ENGINE
20 time=20
30 REPEAT
40 FOR pitch=5 TO 6
50 SOUND 0,-15,pitch,time
60 NEXT pitch
70 time=time-2
80 UNTIL time=10
90 REPEAT
100 SOUND 0,-15,5,time
110 SOUND 0,-15,6,time
120 UNTIL FALSE
```

Still, enough of this nostalgia. What about the two values we've ignored? What do they do?

It's quite simple really, if you think about it. We've been using the bit of the SOUND command that we normally use for selecting the pitch (higher or lower) to pick the kind of noise we want, white or periodic.

So how do we change the pitch of the

noise we are making? Can we make the white noise and the periodic noise go up and down in pitch like normal notes on the other sound channels?

The answer is that we can, using values of 3 and 7 in the pitch parameter of a channel 0 SOUND command.

If you put these values in the pitch parameter then the pitch of the noise that is played depends on the pitch of a note that is playing on sound channel 1.

In other words, by using 3 or 7 you can use a SOUND command on channel 1 to alter the pitch, higher or lower, of periodic and white noise, respectively.

Program VI shows this being done with the pitch parameter in line 30 set at three. Run it and see what happens.

```
10 REM PROGRAM VI
20 FOR pitch=100 TO 200
30 SOUND 0,-15,3,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

As you'll hear, the pitch of the noise goes upwards. This is because the FOR... NEXT loop is raising the note produced by the channel 1 SOUND command in line 40.

The pitch of the note produced by line 30's channel 0 SOUND command varies with the pitch of the note from channel 1.

If you look carefully at line 40 you'll see that the amplitude has a value of 0 which means that you can't hear what is being played on that channel.

It still varies the noise on channel 0, however. In fact it's a good thing that you can't hear the channel 1 note.

Run Program VII and you'll see what I mean.

```
10 REM PROGRAM VII
20 FOR pitch=100 TO 200
30 SOUND 0,-15,3,20
40 SOUND 1,-15,pitch,20
50 NEXT pitch
```

A mess, isn't it?

Now try Program VIII which, like Program VI, plays a rising sequence of periodic noises.

```
10 REM PROGRAM VIII
20 FOR pitch=50 TO 100
30 SOUND 0,-15,3,40
40 SOUND 1,0,pitch,40
50 NEXT pitch
```

Both of the duration parameters of the SOUND commands are the same.

What would happen if they were different?

Try changing the duration parameter in line 40 to 20 or 10 or 60 and see what happens.

Can you explain the odd effects? I'll give you a clue if you just stand in the queue!

If you make the pitch parameter 7 instead of 3 in the last three programs you'll see that channel 1 has the same effect. Only this time it's a rising stream of white noises that are produced.

Finally, let's have some sound effects. Run Programs IX and X and you'll see what you can do with 3 and 7 as the pitch parameters.

The first uses periodic noises to produce a motorbike or moped sound:

```
10 REM PROGRAM IX
20 REM MOTOR CYCLE
30 FOR pitch= 100 TO 120
40 SOUND 0,-15,3,5
50 SOUND 1,0,pitch,5
60 NEXT pitch
70 SOUND 1,0,pitch,80
80 SOUND 0,-15,3,80
90 FOR pitch= 120 TO 100 STEP -1
100 SOUND 0,-15,3,5
110 SOUND 1,0,pitch,5
120 NEXT pitch
130 SOUND 1,0,pitch,20
140 SOUND 0,-15,3,20
```

The second uses white noise to imitate an unsuccessful rocket!

```
10 REM PROGRAM X
20 REM ROCKET
30 FOR pitch= 100 TO 200 STEP 4
40 SOUND 0,-15,7,5
50 SOUND 1,0,pitch,5
60 NEXT pitch
70 SOUND 1,0,pitch,80
80 SOUND 0,-15,7,80
90 FOR pitch= 200 TO 100 STEP -4
100 SOUND 0,-15,7,5
110 SOUND 1,0,pitch,5
120 NEXT pitch
130 SOUND 0,-15,6,60
```

Anyway, that's all for now. If you've liked these sound effects, just wait until we deal with the ENVELOPE command.

As it is, I've got to go and tell the Editor that we're not under rocket attack and that it's safe to crawl out from under the desk.

Sound affects him, too!

Nigel Peters

TWO EXCITING NEW PROGRAMMES FOR THE BBC MODEL B MICROCOMPUTER

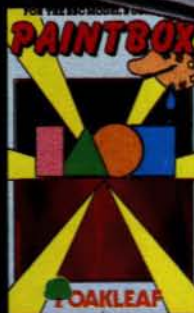
SHUTTLE PILOT

Shuttle Pilot is the most authentic Space Shuttle simulator available. The screen display is a faithful copy of the instrumentation in Columbia, Discovery, Challenger and Atlantis. As you sit at the controls you have the same view through the head up display (H.U.D.) as Schmitt, Evans, Stafford and other Shuttle Pilots. You have to complete your space mission in the face of enemy satellites and land safely. As Armstrong took a step for mankind, when he walked on the moon, Shuttle Pilot steps out as the flight simulator for space travel.



PAINTBOX

The superb Graphics programme for the BBC Model B. That turns your screen into an architect's board or an artist's canvas.



OAKLEAF
COMPUTERS LIMITED

Available at your local computer shop or post the coupon (DEALERS TELEPHONE 0476 60000).

To Oakleaf Computers Ltd, Mail Order Dept., Bell's Yard, Dysart Rd, Grantham, Lincs NG31 7EJ.

☐ Please send me _____ (quantity) 'Shuttle Pilot' Software at £9.95 each including VAT and Carriage
☐ Please send me _____ (quantity) 'Paint Box' Software at £9.95 each including VAT and Carriage

I enclose cheque for £ _____
Please Debit my Access/Barclaycard No. _____

Name: _____
Address: _____

Post code: _____
Day Time Tel No. _____

121, DUDLEY ROAD,
GRANTHAM,
Lincs
0476 76994

100, BOUGHTON
CHESTER
CHESHIRE
0244 310099

WHAT WOULD YOU DO WITH ALL THIS?



HERE'S A CHANCE TO FIND OUT

**GREAT
BRITAIN
LIMITED**



SIMON W. HESSEL SOFT
WARE



Have you ever wondered what you would do if you came into some money? Would you be able to invest it and watch it grow, or maybe start a small business and become a millionaire? With *Inheritance* you have the chance to find out.

£6.95*

£5.95*

**WORLD
TRAVEL
GAME**



**SIMON
W
HESSEL
SOFTWARE**

A game for 1 or 2 players. Your aim is to obtain six souvenirs from six different countries and return to London intact, in the shortest possible time. Keep your head and try to avoid hijacks, bankrupt airlines, bad weather, thieves, car breakdowns, strikes and other problems inherent in World Travel.

£5.95*

All three in special presentation pack **£17.95**

Available at good computer shops or direct from: Simon W. Hessel Software

*30p p&p on single games.

UNLIMITED GUARANTEE

24 hour despatch.

**BBC
32K**

**GREAT BRITAIN LIMITED
INHERITANCE
WORLD TRAVEL GAME**

FINANCIAL GAMES

**SIMON W. HESSEL SOFTWARE,
15 LYTHAM COURT,
CARDWELL CRESCENT, SUNNINGHILL,
BERKSHIRE, ENGLAND.**

**BBC
32K**

Here's your invitation to

Join in the celebrations

We're all having a party to mark the successful first year of *The Micro User*. Trouble is, no one can find a match to light the candle on the cake. Our Birthday program asks you to lend a hand.

BIRTHDAY is *The Micro User's* way of celebrating its first year of existence. All you have to do is to light the birthday candle at the bottom of the screen by guiding a flame from the top of the screen to the candle's wick.

To do this you steer a course between the walls, using standard movement keys.

You'll need the walls as windbreaks to shelter from the gusts of wind that threaten the flame. If they reach it, out it goes!

Watch out for those gusts. They keep on coming even if you don't move.

Worse still, some of these winds are fairly changeable. Every now and then a gust blows diagonally, cutting corners to catch the flame.

Even more devilish, they can combine, disguising two or more gusts as one.

Initially you are opposed by two gusts. But each time you're successful, you have an extra gust to face.

If you are blown out you get another go at the same level. After all, this is a birthday celebration!

If you're good enough you can keep

going until you reach 20 gusts. So far we've only managed to survive 12!

This is how it works:

The program has to keep track of a lot of things – the positions of the walls (there are up to 80), the positions of the gusts (up to 20) and, of course, the position of the flame.

Constant checks have to be made to see, for example, that the gusts don't "blow down" walls.

Rather than record the x and y coordinates of each object, then check both against those of other objects. We've opted for recording positions with the formula:

$$\text{position} = x \text{ coordinate} + 40 * y \text{ coordinate}$$

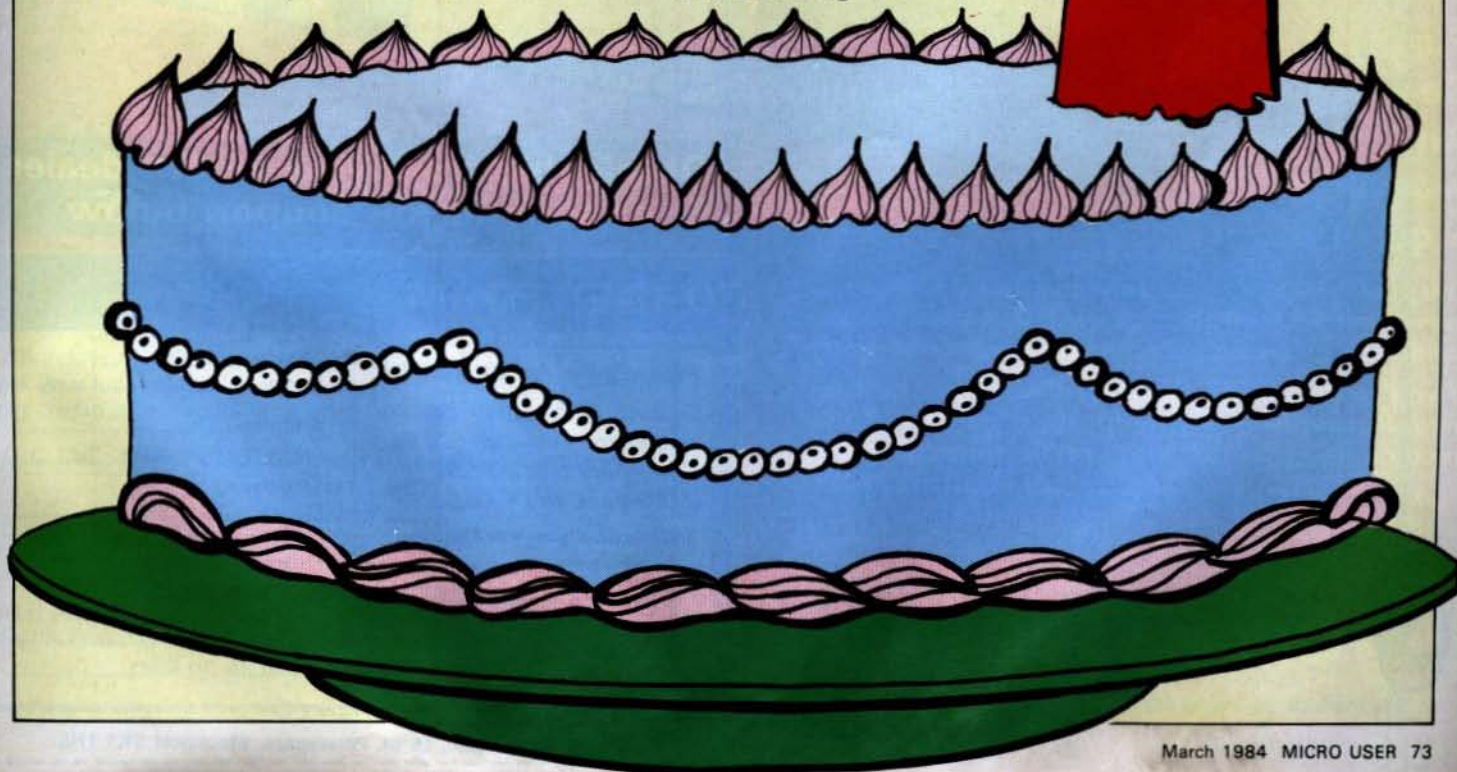
Since in Mode 1 there are 40 characters to a row this gives each character cell on the screen a unique number, which can be quickly compared with others.

If we need the x and y coordinates we can find them with:

$$\begin{aligned} x \text{ coordinate} &= \text{position MOD } 40 \\ y \text{ coordinate} &= \text{position DIV } 40 \end{aligned}$$

The procedure and variables descrip-

Turn to Page 159



You'll be *ITCHING* to get your hands on the funniest program of 1984!



**Fleas!
Bed Bugs!
And all you
wanted was
a quiet night . . .**

The pests are after your feet and you'll have to move fast to stop them. Swot them with a jam sandwich or crunch them with your false teeth.

If you're desperate you can always phone for help. But whatever you do, do it quickly. You need cunning tactics and nimble fingers!

Bed Bugs guarantees hours of hilarity for the whole family.

**Obtainable from your Acorn dealer
or send in the coupon below**

ORDER FORM

Please send me BED BUGS:

- ☐ BBC 'B' cassette - £6.95
- ☐ Electron cassette - £6.95
- ☐ 40-track disc - £8.95
- ☐ 80-track disc - £8.55

Add 50p p&p (post free 2 or more)

Name

Address

.....

.....

.....

☐ I enclose cheque made payable to Optima Software Ltd.

☐ I wish to pay by

☐ Access ☐ Visa

No

Signed

Expiry date

Optima Software Ltd., 36 St. Petersgate, Stockport SK1 1HL.

OPTIMA SOFTWARE

JUST RELEASED

Counter Attack

as demonstrated at the BBC Micro User Show, December 1983.

A game of strategy incorporating unique rotational movement. Simple in concept, stimulating in practice. A game to be equally enjoyed by infants and serious game players alike. Many similar games already exist, however, this game differs from the norm in one distinct area — rotational movement. Includes customisation routine that allows you to tailor the game to your own requirements.

£6.50 for the 32k BBC/Electron

★ ★ ★ ★

DODGY DEALER

"You'll be hard pressed to find a better business game for the BBC Micro than this grand effort." (TV Choice, Nov. 1983.)

"Best of the lot is a new one called Dodgy Dealer; a cracking Christmas present for the bored business exec." (Office of the Future — Nov/Dec 1983.)



"Now available from W.H. Smith and Lightning"

A captivating game emulating the real business world. As boss of a small manufacturing company, you are required to make executive decisions to enable your company to survive and even prosper in the face of strong competition. The game is dynamic: the more your skills improve, the greater the competition becomes.

£6.50 for the BBC B 1.2 o/s

★ ★ ★ ★

One of the biggest attributes that a computer has is the capability to sort vast amounts of information. But have you ever wondered how a computer carries out the sorting process?

SORT ANIMATOR

is the first in the Computer Tutorial series by OIC, explaining visually and in detail how a selected variety of sorts work. Also includes routines that can be used in your own programs.

£6.50 for the 32k BBC

★ ★ ★ ★

All products supplied on cassette and can be easily downloaded onto disc.

All prices include VAT and P&P.

★ ★ ★ ★

Latest reviews of both Dodgy Dealer and Sort Animator can be found on page 600121463 of the Micronet 800 database.

★ ★ ★ ★

Products available from your local dealer or by mail order direct from OIC at our FREEPOST address.

Barclaycard telephone orders welcome (0344) 773229.

Ask your local dealer for a demo of our products and details of our cream label products or alternatively write to OIC direct at:

OIC Ltd., Dept. OPD/TMU4, FREEPOST, Camberley, Surrey GU15 4BR

Dealers/distributors

contact Richard Edwards on (0344) 773229

★ ★ ★ ★

Programmers/games designers . . .

send your programs/ideas to us for free evaluation, or send for details of our product development pack. Generous royalties paid on all ideas/games published.

MICROBYTE SOFTWARE

3D Space Ranger



For
**BBC
32K**

£7.95

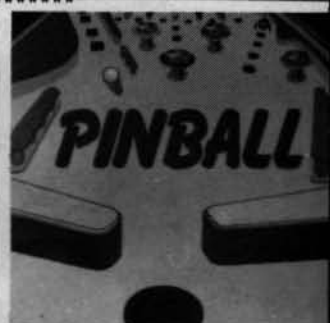
- SUPERB 3D GRAPHICS.
- FIVE DIFFERENT LEVELS OF PLAY.
- ALL MACHINE CODE GAME.
- BATTLE THROUGH SPACE ATTACKS.
- AVOID HURTLING ASTEROID BELTS.
- SKIM OVER THE DEATH STAR SURFACE.
- DESCEND INTO THE TRENCH.
- BATTLE WITH ATTACKING ANDROIDS.
- YOUR MISSION — DESTROY THE DEATH STAR ... AND THEN ESCAPE!



ER*BERT

Fast and funny, it's Herberts Cubic Domain! You must help him avoid his unwanted guests.

BBC or Electron: **£7.95**



PINBALL

The original arcade table game. Superb graphics and sound.

BBC or Electron: **£5.95**

REVERSI BBC or Electron: **£5.95**



Orders to:
MICROBYTE SOFTWARE (M2)
FREEPOST
NEWQUAY TR7 2BR.
NO STAMP NEEDED IF POSTED IN U.K.
All prices include Post & Packing.

ALICE continues her perambulations through Adventureland, pausing to view three offbeat programs for the BBC Micro:

Pimania, Automata Ltd, £10.
Community, Ixion Software, £6.90.
Bridge to the East, Ixion Software, £8.05.

THE types of puzzles and problems within an Adventure are unlimited. This month we've tried three games which include some new twists in the usual format such as clues in tunes, economic problems and a mixture of puzzles and keyboard dexterity. The last one was reviewed by nimble fingers Nigel.

Let's start with Pimania:

Remember the Masquerade hare which was buried somewhere in England? All you had to do was solve the puzzles in the book by Kit Williams and then go to the right place at the right time and dig it up.

Pimania is rather similar in that you have to make the program reveal a date and place where the promoters will meet and give to you a golden sundial, worth £6,000, providing you can tell them how you solved the puzzle.

That rule should stop any cheating because you might be able to decode the when and where but how to open the "Ultimate Gate Of Pi" appears to be a nasty factorial problem.

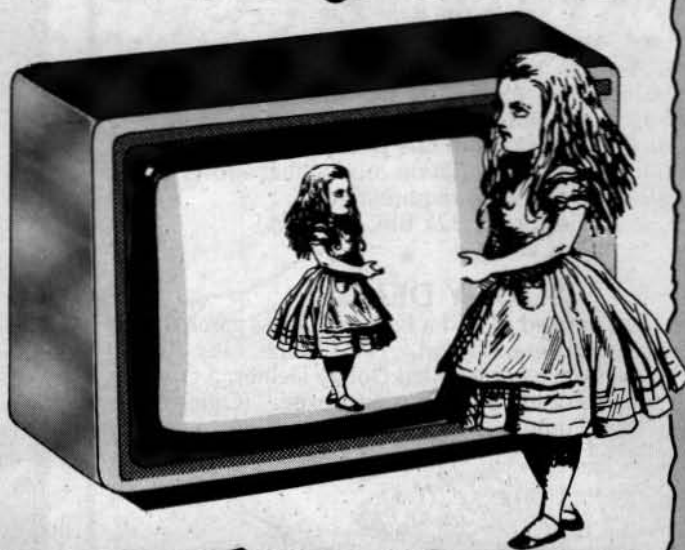
The puzzle has been out for over a year but only recently on the BBC Micro so I presume it is still unsolved.

The program has some animated pictures and begins with the Greek letter PI flying up into the air and the cryptic query, "A key fits the lock?". Give it the keyword and you meet the PI man, who can be helpful, annoyed, unhappy, hungry or bored.

The program is full of tunes which,



Alice through the VDU



Our monthly foray into Adventure games

PI man's world hides big prize

after a while, will make you stuff the loudspeaker with cotton wool, but some of them are clues. For example one of them is a hint about how you move around in the PI man's world.

There appear to be, at the start, about 20 rooms to investigate with objects placed randomly in four of them. Their locations shift every time you start a new game.

The map of the game is simple but some rooms are only accessible randomly and the PI man's appearances are also slightly erratic.

The puzzle appears to be to locate a number of objects like a blackboard, calendar and telescope, and drop them at a certain location in the correct order.

There are 3,628,800 ways of dropping 10 objects but the PI man who helps you find the objects also tends to take them back, particularly when you do the wrong thing, so he's still actually helping you.

After a few hours I was still trying to reason out the correct order and getting a bit tired of going over the same ground again and again.

It seems that, like twisty mazes, the only way to make progress is to SAVE and then try, try, try again.

Of course the prize will keep many people at the keyboard. I actually got a



sundial but couldn't remember how I did it and failed to drop it anywhere.

It doesn't matter anyway as computer professionals (such as myself) are banned from the competition.

This version has been translated for the BBC and seems to have a few slight bugs. For example, you are told there is a telescope in the room but, when you try to take it, you are told that the program can't see a telescope.

The program can take quite sophisticated sentences like "Give the pork pie to the PI man", which implies that the solution might require quite elaborate commands.

It's an unusual Adventure which, with the prize incentive, should keep the more mercenary among you occupied for weeks.

Lesson in survival

ALTHOUGH it is not a true Adventure – because the object is to survive rather than solve puzzles – Community, from Ixion, has a number of features that should appeal to those whose sword arm has become weary and now wish to retire to a quiet life down on the farm.

It is derived from the Kingdom game on the BBC Welcome tape which has been popular in primary schools. But this is far more realistic and complicated.

The Magnificent Seven might have saved you from the old bandits in the hills but now you have to contend with bad weather, rats eating the grain and plagues. Your animals will die and your peasants are a particularly revolting lot.

At times you will have to visit the bank manager for a loan and his middle name must be Dracula. (Ah for the good old days when a stake through the heart was the answer and treasure just lay on the ground.)

Teachers, particularly of economics, should find this program very useful because it will not only keep their pupils occupied for hours but should also instil quite a few useful lessons in economic and business strategy.

A multitude of possibilities have to be simultaneously considered and balanced.

You can rear four types of animals and grow four types of grain.

Each type of grain is susceptible to different weather conditions which are predicted by a magician, who is right about half the time.

Having raised and grown some food you must feed your livestock and your peasants and then get the surplus to market.

It's a good idea to feed the rabble because you will need some of them for protection on the way to market as a number of nasty things can happen on this perilous trip.

This game has a number of useful ideas for the Adventure writer. But it is a good program in its own right, particularly if played by a group because then an element of competition can be easily introduced.

Like many other games in this genre you will probably last longer by making conservative decisions. But it's a lot more fun to take gambles.



BRIDGE to the East is different again. It consists of five different screens of interactive games like Rocket Raid and Killer Gorilla, with a different background display for each screen.

Separating each screen is a riddle which has to be answered before you can try the next screen.

On each screen you, in the form of a wizard holding a staff, must protect a specified place – or, in one case, persons – and collect numerous items.

These feats are achieved by moving the wizard shape around the screen with the Z (left), X (right), / (down) and * (up) keys.

Before each screen you are asked if you want to practice or take the test, which means you are allowed to practice any screen for as long as you like.

This is helpful because if you fail the test you cannot go back – you have to go on to the next screen after answering the riddle.

This is the point where you are told what you must accomplish on the next screen and also the point where you can save the game.

As each screen and riddle is loaded into the BBC separately it is a good idea to save the game as often as possible as it can take a considerable time to progress back to, say, the fifth screen from the start of the game if you happen to fail one of the intervening tests.

Another unusual feature of this game is that, whenever you win or lose, each

Bridge over troubled territory

screen has its own piece of poetry which is displayed. Like:

*They go, leaving a trail,
Of broken faith
They come, bringing venom
From rotten lakes,
Carved from lead mountains,
With a man's femur.*

This does not have any relevance to the game but makes a change from the usual one line saying, "You have been killed", or words to that effect.

The idea behind the game is that once upon a time there were some crystals of power which were destroyed by evil fiends. It is your job to collect the two pieces of the crystal star and score more than 20,000 points, so that a seance can be held and the crystals can be rebuilt.

The two pieces of the crystal star are in the huts on screens 1 and 2, and to get them you have to win those two screens.

So to the screen displays, starting with screen 1 which is a display of a



valley, with a background of mountains and trees. It contains a red hut which you must protect from all the shapes, which range from birds to rocks, that try to attack it.

On this screen you have to score more than 2,000 points by destroying the attacking shapes and collecting ten crystals which shoot across the screen from right to left, which can prove fairly difficult.

The first riddle gives you a long, rambling monologue followed by a description of a door which is opaque and glowing.

You are also told that no amount of force will cause it to open but, being a wizard, you may effect the door in any other way you choose.

This is a bit like an Adventure type problem but with less clues, as the answer to the problem is to type in 'FREEZE DOOR'.

I think you have to work out this answer because the door is glowing so it must be hot, but if you say 'TOUCH DOOR' you are not given any clues like, 'You just burnt your hand'. All you get is, 'THAT HAD NO EFFECT'.

This example sums up all the following riddles and is the only major criticism that I have of the games.

Also the riddles are not random. So every time you take the tests you will have to answer the same old riddle, which could prove rather tedious.

To find some of the answers I had to resort to listing the program as the clues get even vaguer.

Screen 2 has a background similar in layout to screen 1, but this time your wizard has to protect a pinnacle of rock from a different assortment of shapes. He also has to collect five crystals which shoot across from left to right.

Although similar sounding to screen 1 this screen is a lot more difficult.

After progressing through the second riddle you arrive at screen 3, which has a totally different appearance.

Your viewpoint is from the inside of a cave looking out through the entrance to the sea where a red sun is setting.

Across the inside of the cave is a bridge over which two figures are trying to cross. Your wizard's job is to escort them safely. You may also collect flying crystals if you have time.

After the third riddle comes the sea hermit's hut, which you have to protect. On this screen the top half of the display is a mountain range running down to the bottom half of the display which is a

Five into one goes down fine

beach with the sea coming onto it.

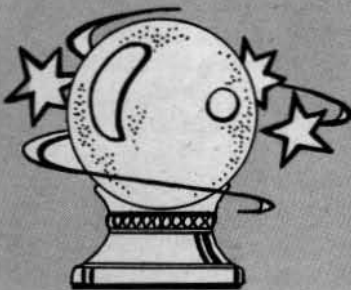
You have to collect 26 eggs which are dropped by attacking seagulls. But you have to be quick as the eggs will hatch in no time at all and attack the hut.

On this screen the sounds generated are excellent as you have the sound of the sea washing in on the beach as well as the usual sounds whenever you destroy anything.

And so past yet another riddle onto screen 5, which is a display of a mountain canyon spanned by a bridge, in the middle of which is a large cross.

Here you have to protect the cross from an array of objects. You also have to fight the black prince, who is represented by another figure the size of your wizard which is constantly attacking you.

Your source of magical power is the



cross, so when an attacking object hits the cross the prince gains in strength.

You gain strength by destroying the objects but the prince can do this as well.

You may attack the prince by striking him with your staff above the height of his sword but, of course, he can do the reverse to you and usually does so with more success.

All the time you are battling, your score and the prince's are displayed on the bottom of the screen.

This is the only screen which displays your scores while you are fighting, which is another minor criticism.

I found it exceedingly difficult, requiring the highest degree of manual dexterity of any of the many games I have mastered.

After plucking up courage and a little bit of skill you can take test 5. You then proceed onto the last riddle, which is the

conclusive part of the game.

When you have answered this riddle you go into the seance to restore the crystals back to power.

Whether the seance is successful depends on your score and if you won on screen 1 and 2.

If the seance is a success then the crystals are returned to their original power and the forces of evil are left to roam the earth until you attempt the game again.

All of the five screens are laid out in a visually pleasing manner. This, coupled with the high standard of detail in all the moving figures, provides each screen with a different, top quality graphical layout.

The movement of all the figures is to a high standard, being smooth and judder free even when numerous moving objects occupy the screen at once.

The response of your own figure is smooth and responsive to the keyboard controls.

The varied sounds generated are also pleasing, as they don't drag on and on.

The riddles, however, prove to be tedious. Once you have read or answered the puzzle, you don't want to keep seeing and answering the same riddles on every game.

A score display while you are engaged in a game would have been helpful. It proved rather frustrating not knowing how many points you still required to progress further.

In conclusion I found Bridge to the East fairly compulsive and quite a challenge, and well worth the money, as this novel idea is like getting five games in one.

The answers to the riddles are in Figure 1, which we've considerably printed upside down!

Alice and Nigel

Riddle

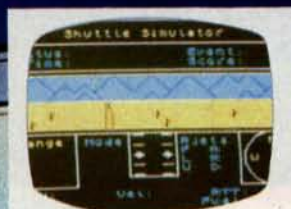
1 < FREEZE BLOCK
2 < DID YOU SAY RALLABATZ
3 < I AM LYING
4 < PTERODACTYL
5 < 41, 101

Figure 1

LIFT OFF with



SPACE SHUTTLE



SPECTRUM LAUNCH STAGE



DRAGON 32 ARM STAGE



BBC FINAL STAGE



ATARI FINAL STAGE

MISSION BRIEF

Successfully pilot the Shuttle through Launch, Fetch & Finals. Take off and position Shuttle in orbit
Manoeuvre alongside malfunctioning Satellite. Retrieve - then re-enter to glide without fuel to White Sands Desert.

PREVIOUS SUCCESSFUL MISSIONS

EXCELLENT - "Personal Computer News"
A WELL THOUGHT OUT GAME - "Dragon User"
ALMOST WORTH BUYING A DRAGON FOR -
"Which Micro"

MISSION STATUS

Available for
48K ORIC 1, ATARI 16K, DRAGON 32, BBC
MODEL B, SPECTRUM 48K, COMMODORE 64,
ACORN ELECTRON, TANDY COLOUR 32K
CASSETTE £8 DISK £10



Postal Orders to
41 Truro Road, St. Austell, Cornwall PL25 5JE
Telephone/Credit Card Order
Tel: 0726 3456



MICRODEAL



Available from computer dealers
nationwide or from larger branches of

John Menzies

ORLANDO'S BACK!

ZALAGA

Aardvark Software, creators of the Ultimate Atom Games, bring you NOW
THE ULTIMATE BBC SPACE-GAME



Seated at your computer, streams of multi-coloured aliens swirl past your laser-base into formation. The first squadron appears harmless, but later waves will avenge the deaths of their comrades with increasing ferocity. To combat the swooping bomb dropping meanies, you may try to link up a pair of laser-bases and **double your fire power!** Your progress through successive phases will be rewarded by challenge stages, where large bonuses may be earned. The game builds up to a dizzying crescendo of high speed motion where instant reflexes and pure technique are your only hope of survival. . .

- One or two player game • Keyboard or joystick • Sound on or off • Escape facility
• Works on all OS's and Tubes • Ten name Hi-score table • Mode 2 full colour graphics • Continuous rolling twinkling stars • Multiple missiles • Full screen action • Attractively packaged in a collectable library case • High quality cassette • Full instructions • For BBC model B or A + 32K •

Send cheques/P.O.s for £6.90 to

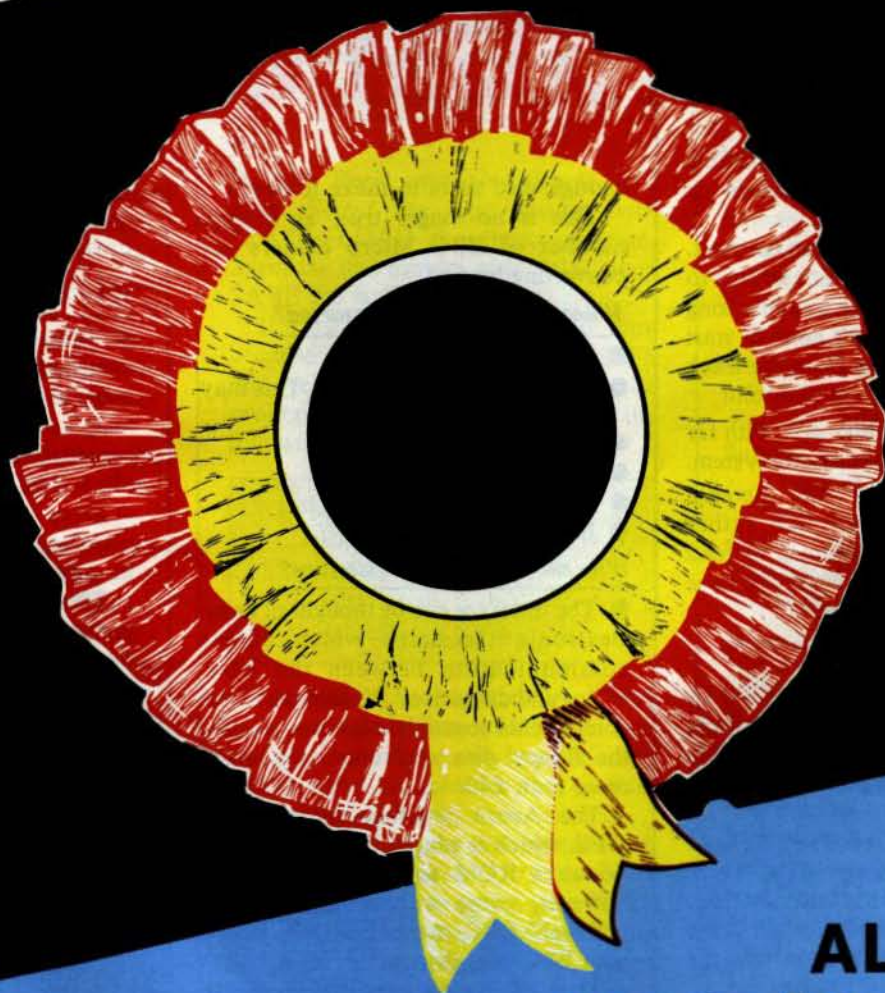
**Aardvark Software,
100 Ardleigh Green Road,
HORNCHURCH, Essex.**

FRAK coming soon . . .

THE MICRO USER

presents . . .

**YEAR
OF
THE** **DISC**



**ALL you
wanted to know
about using discs
on the BBC Micro**

JIM NOTMAN answers your basic questions

RECENTLY there has been a great increase in interest in discs and disc drives for the BBC Micro. Many owners feel that once they have mastered the cassette filing system they need to move on to something better.

Why use discs?

- The most impressive feature of using any disc system is its speed. A program which could take many minutes to load from tape takes only a few seconds from disc.

Even if it is the last program that was put onto the disc it is found very quickly. Contrast that with a tape with several programs on it. It may take a considerable time to just find the program.

- Disc systems allow the more flexible use of files, like relative (random or direct) access files.

Tape files need to read from the start. Disc files can be read from or written to any position you like. Just as with a long playing record, you don't need to start from the beginning, but from the track you require.

- Disc systems load and save with far fewer errors than on the cassette system.

- Converting to discs may increase your use of the micro. It's rather offputting waiting 10 minutes to load some software from tape when you have only half an hour to spare.

Are there disadvantages?

- Cost is the main one. About £300 for the simplest system, though by keeping your eyes open (looking through *The Micro User!*) you may pay considerably less.

- The disc system reserves 2½k of memory for its own use. In a cassette-only system, the memory from 3584 (&E00) is available for program use. In the Acorn disc system only the memory from 6400 (&1900) is free.

- Discs need to be looked after more carefully than cassettes as they are more vulnerable to damage. A fingerprint or a piece of cigarette ash could be all it takes to ruin a disc.

- Many software companies have been slow to issue their programs on disc. The excuse has been that there are not

All the facts you need to get you started

enough disc users to make it viable.

This is no longer true, as a large number of BBC Micro owners are converting to disc.

What do I need to get started?

- Disc interface.
- Disc Filing System (DFS). This may come with the interface.
- Floppy disc drives.
- Connecting leads.
- Utilities disc.
- Blank discs.

Why do you need an interface?

- The interface can be thought of as an electronic translator which allows communication between the BBC Micro and disc drives. While most of the components cost only a few pence each, the floppy disc controller chip costs more than £40.

The Acorn interface includes the DFS, which is plugged into one of the sideways ROM sockets. It does not, however, come with a manual. The "official" BBC manual is only issued with BBC disc drives.

The standard interface is single density. This refers to how closely the information is packed on the disc.

At least two firms are working on a double density system (requiring a different floppy disc controller) which can put twice as much information onto a disc.

These systems need to have their own

special DFS to instruct the different disc controller. (This is not the same as having 40 or 80 track drives.)

Why do you need a filing system?

- Whenever the BBC Micro is switched off any programs or data that were in RAM are lost. If you want to keep any of this information it must be recorded in some way. File systems allow you to do this.

Since each method of saving the information is different, each must have its own filing system.

The DFS interprets any filing commands you give and carries them out without you having to know how it does it.

The operating system of the BBC Micro is arranged so that commands are not changed with filing system changes. Any command associated with filing is directed to the correct filing system.

Changing the file system is very easy:

- ☐ For the DFS type in *DISC (or *DISK).
- ☐ For the tape system *TAPE (for 1200 baud), *TAPE3 (for 300 baud).
- ☐ For the Econet system *NET.

Will I have to learn a lot of new commands?

- All the commands that you learned for the cassette filing system will work

equally well with the DFS.

In addition there are extra commands just for the DFS.

*HELP (Return) gives a list of the paged ROMs that are in the BBC Micro.

*HELP DFS (Return) lists the extra DFS commands, as illustrated in Figure I.

```
DFS 0.90
ACCESS <afsp> (L)
BACKUP <src drv> <dest drv>
COMPACT (<drv>)
COPY <src drv> <dest drv> <afsp>
DELETE <fsp>
DESTROY <afsp>
DIR (<dir>)
DRIVE (<drv>)
ENABLE
INFO <afsp>
LIB (<dir>)
RENAME <old fsp> <new fsp>
TITLE <title>
WIPE <afsp>
```

Figure I

Most of the commands manipulate program or data files that already exist.

Many are self explanatory like *RENAME for changing a files name, *COPY and *DELETE. *TITLE allows the disc itself to be given a name.

*DESTROY seems somewhat over dramatic, but is able to delete a number of files at the same time.

*INFO gives information about the file like its load address and where the file is physically located on the disc.

As well as the main DFS commands there are a number of disc utilities. The commands are given by *HELP UTILS, illustrated in Figure II.

```
DFS 0.90
BUILD <fsp>
DISC
DUMP <fsp>
LIST <fsp>
TYPE <fsp>
```

Figure II

DUMP gives the hexadecimal value and Ascii equivalent of each byte of a named file. This can be helpful if you like to see what is being put onto the disc.

Discs can be made far easier to use than tape. The DFS will look for a file called !BOOT when the Shift key is held down together with the Break key.

This allows programs to be loaded

and run — that is, if you've given the disc the correct instructions!

Are there other DFSs?

● There are a number of alternatives to the official Acorn 0.90 DFS. Watford Electronics and Amcom both produce their own.

One of the main problems with these others is software compatibility. This is especially true of software packages which employ software protection.

The main advice here is to ask the dealer whether the programs you buy are compatible with the DFS you have.

Why bother with alternative DFSs?

● They usually have a number of features in them which are lacking in the Acorn version, some of which are very useful.

For example, with the Acorn system only 31 different files can be held on one side of a disc. Several different DFSs increase this limit to about 60.

Can I copy my programs from tape to disc?

● With Basic programs this is very easy. Select the tape system with *TAPE, LOAD the Basic program, select the disc system with *DISC then SAVE the Basic program.

If this program is now too long because of the memory space the DFS has reserved for itself, move the program down in memory using the following:

```
1 *KEY 0 *TAPE:M NZ=PAGE-&E00
: FOR LZ=PAGE TO TOP STEP 4
: ! (LZ-NZ)=!LZ
: NEXT
: PAGE=&E00:M OLD:M
```

Machine code programs are a little more awkward. They must be put into exactly the same memory locations they would have occupied in the cassette system if they are to work correctly.

First switch to the tape system with *TAPE. Now type in *OPT1,2.

Looking at the program with *CAT will give you the load address of the program, the execution address (where a machine code program is run from) and the length of the program.

Once these details are known the program may be loaded into memory above the area the DFS reserves, then moved to the memory locations it would have occupied with the tape system.

All that remains is to CALL the execution address.

YEAR
OF
THE

DISC



Further details on transferring cassette programs to disc are given in the August issue of *Micro User*.

Not all programs can be copied easily, because many companies are now using some form of software protection.

I've heard of hard discs and floppy discs. What's the difference?

● Nearly all discs used with the BBC are floppy discs, so called because they are thin flexible discs of plastic coated with a magnetic recording emulsion.

Hard discs are much more sophisticated. A unit consists of a number of magnetic coated metal discs, mounted in a sealed unit and turned at high speed.

The reading and recording heads "float" a very small distance above the disc. Even very small particles of dust, human hairs or tobacco smoke may damage the discs if they come between the heads and the disc surface. Hence the sealed unit.

They are more expensive than floppies but can hold much more information, several megabytes rather than the hundreds of kilobytes the floppies have to offer.

A number of companies are working on hard discs for the BBC, though in several cases the software seems rudimentary. Hopefully this should be resolved shortly.

What sorts of floppy disc drives can you get?

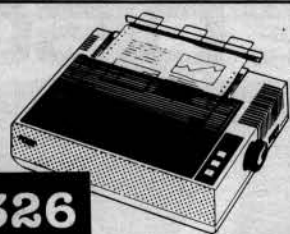
● It is possible to use the BBC Micro with 8in floppy discs, a size associated more with larger or older computers.

More recently 3in micro floppies have started to appear, though there is more than one type of these. They are very compact and should prove popular, but at the moment there is little software written on them.

The commonest drives use the 5¼in mini floppy disc. Whatever the size of drive, the information is written on it in circular tracks.

There are two main groups of disc drives, those having 40 tracks and those with 80.

The 80 track machines are more



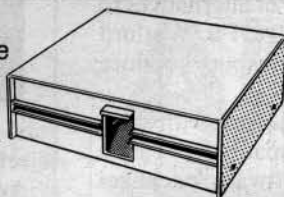
Epson Fx 80 Printer

£326

Including lead for BBC.
Send £375
to include VAT, p&p.

200K 40 Track Disk Drive

62 file names
including cable and power lead.
Send £175 to include VAT, p&p,
inc. formatting disk & manual.
800K & 800K switchable with
power supply available — ask for details.



£152

JOIN THE BBC DISCOUNT CLUB FOR THE KEENEST PRICES ON BBC COMPATIBLE PRODUCTS

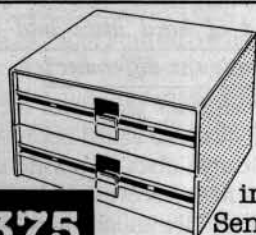
400K 80 Track Disk Drives

124 file names
including all necessary leads.
Send £299 to include VAT, p&p,
inc. formatting disk & manual.



£259

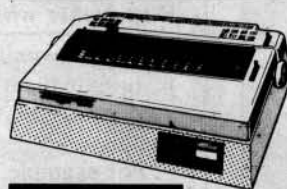
Send
for a full list
of all our
drives!



800K Disk Drives

800K & 800K Switchable
124 file names
including cable & power lead.
Send £432 to include VAT, p&p.
Send £460 for 800K Switchable.

£375

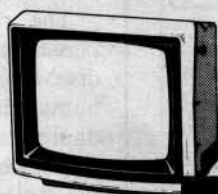


Juki Daisywheel Printer

£338

18 CPS including cable.
Send £389 to include VAT, p&p.

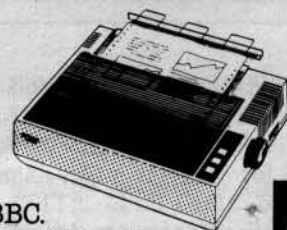
Sanyo/BMC Monitors



12" amber or green screens.
Send £99 to include VAT, p&p.

£86

Epson Rx 80 FT Printer



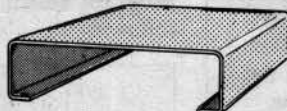
Including lead for BBC.
Send £299 to include VAT, p&p.

£260

Diskettes

Memorex, in packs of 10
SS 40tk £16.00
DS 40tk £20.00
SS 80tk £26.00
DS 80tk £29.00

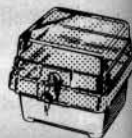
Including VAT, p&p.



Disk storage boxes
£15.00 (takes 35)
Disk storage boxes
£20.00 (takes 80)
Prices include VAT, p&p.

Accessories

BBC Stands £10.00
Dust covers £4.95
(for BBC,
Drives and
Printers)



Product	Price to members	Qty.	Total
200K DISK DRIVE	☐ £175.00		£
400K DISK DRIVES	☐ £299.00		£
EPSON FX 80	☐ £375.00		£
800K DISK DRIVES	☐ £432.00		£
800K SWITCHABLE	☐ £460.00		£
JUKI PRINTER	☐ £389.00		£
SANYO/BMC-AMBER	☐ £99.00		£
SANYO/BMC-GREEN	☐ £99.00		£
EPSON RX 80 FT	☐ £299.00		£
SS 40 DISKETTES	☐ £16.00		£
DS 40 DISKETTES	☐ £20.00		£
SS 80 DISKETTES	☐ £26.00		£
DS 80 DISKETTES	☐ £29.00		£
BBC STAND	☐ £10.00		£
DUST COVERS	☐ £4.95		£
DISK STORAGE (35)	☐ £15.00		£
DISK STORAGE (80)	☐ £20.00		£

MEMBERSHIP APPLICATION FEE ☐ £10.00
TOTAL SUM ENCLOSED (Cheque or credit card no.) £

To: The BBC DC, 46 Princes Avenue, Finchley, London N3.

I enclose my order for the above products at discount as a member of the BBC DC. I understand I will receive mailings of new products and special offers as they become available.

Name _____

Address _____

Signed _____

I would like you to return my money if the goods ordered are not despatched within two weeks of receipt of order. ☐

ALL PRODUCTS ARE BRAND NEW,
BOXED AND OFFERED WITH FULL
MANUFACTURERS WARRANTY.
ALL QUERIES WILL BE ANSWERED
BY MAIL.

**BBC
% DC**



From Page 83

expensive because their tracks are much narrower and therefore must be made more accurately. A 40 track disc can store 100k of information on one side, an 80 track disc 200k.

Some drives use only one side of the disc and are known as single sided. Others which use both sides are called double sided.

Then you may have a single drive or two drives in the same box. These are known as dual drives.

There is also a choice of having either a power supply from the BBC itself or having a separate supply in the drive unit. As there are a number of combinations the choice becomes bewildering.

Which disc drive should I get?

- For small business use you really need to use an 80 track system with dual

drives, preferably double sided.

For home use the main consideration will probably be cost. 40 track drives are perfectly adequate. Even the least expensive, a single sided, single 40 track drive is better than not having discs at all.

If you can afford dual drives you'll find them more useful, especially when using data files from different discs and file copying.

I prefer drives which have their own separate power supply as this leaves the power point on the BBC for other uses.

Do I need a utility disc?

- This will depend on which DFS you buy. To be able to use a new, blank disc it must be formatted.

This involves putting a number of magnetic marks on the disc so that the floppy disc controller knows where it can place or read data.

Some of the alternative DFSs have a

format command included in the DFS ROM – unlike the Acorn system where the format program is on a utility disc.

The other useful utility needed is VERIFY. This looks through the disc checking that it can be correctly read.

Apart from the basic utility disc, you may want some other utilities.

One that is particularly useful is a package which transfers tape programs onto a disc. Even many programs which are software protected can be transferred, though not all.

When you have spent hours punching in a program you want to be sure that it really is saved correctly on disc. MARK SMIDDY shows you how with his verify routine...

THE object of this verify routine is to check that the contents of a program file on disc (or tape) are exactly the same as the contents of memory. Or to put it another way, to check that the five hours of work you have just SAVED will actually be what you typed in when you reload it.

The program, which is assembled at &1800, is suitable for use with model A or B with Acorn DFS or standard cassette, and is compatible with all operating systems.

After running the program you can call the verify routine by using CALL &1800. Of course, the program you wish to verify should be in memory!

Instructions showing how to save the assembled code are displayed when the program is run. It will remain resident during most filing operations, but it is wise to reload the assembled code whenever it is required.

Here's a full program description. In the following text A refers to the 6502 accumulator, X refers to the 6502 index register X, and Y refers to the 6502 index register Y.

The program can be split into five

Verify what you SAVE, then you won't be sorry

main sections:

1. GET the filename.
2. Open a read only file.
3. Check the file byte by byte.
4. Close the file.
5. Output any messages.

1. This section uses the rarely used call OSWORD with A=0 to input a

string of Ascii characters of specified range up to a specified string length. The string input will be used as the filename.

The maximum string length is set to 7 in line 130, and should be changed to 10 if the utility is to be used with cassette.

2. This uses the OS call OSFIND



From Page 85

with A=&40 to open a file for read only. The file handle (the number assigned to it) will be returned in A and not in Y as is stated in the User Guide.

OSFIND returns with the zero flag set if no file could be opened.

3. This uses OSBGET to take each byte sequentially from the file and check to see if it is the same as the next byte in memory.

4. OSFIND is used again to close the

file whose file handle is held in Y.

5. This outputs any messages using OSWRCH, starting at a point in the text pointed to by the X register.

Lines:

- 10-60 Initialise variables.
- 70-80 Output 'Input Filename' message.
- 90-180 Set up OSWORD parameter block.
- 190-220 Set up X and Y and call OSWORD with A=0.
- 230 Jump out if ESCAPE is pressed.
- 240-310 Initialise M/C variables, and call OSFIND with A=&40 to

open a file for read only.

- 320 Test to see if any file was opened.
- 330 Save file handle.
- 340-360 Get next byte from the file.
- 370 Test for End Of File marker.
- 380-480 Compare with next byte in RAM and increment pointers.
- 490-520 Output End Of File error.
- 530-560 Output file not found message.
- 570-590 Output Verify error.
- 600-640 Close the file.
- 650-710 Output messages.
- 720-760 Make a BEEP.
- 770-820 Reserve some space for the OSWORD control block.

```

10 MODE 7
20 osword=&FFF1
   iosfind=&FFCE
   iosbget=&FFD7
30 FOR NZ=0 TO 2 STEP 2
40 PZ=PAGE -256
50 LOPTNZ
60 .START
70 LDX #10
80 JSR message
90 LDA #(msg) MOD 256
100 STA block
110 LDA #(msg) DIV 256
120 STA block+1
130 LDA #7
140 STA block+2
150 LDA #33
160 STA block+3
170 LDA #126
180 STA block+4
190 LDX #(block) MOD 256
200 LDY #(block) DIV 256
210 LDA #0
220 JSR osword
230 BCS out
240 LDA #0
250 STA &70
260 LDA &18 \ =PAGE e.g. (&1900)
270 STA &71
280 LDA &40
290 LDX #(msg) MOD 256
300 LDY #(msg) DIV 256
310 JSR osfind
320 BEQ error1 \ No file error
330 STA &72
340 .loop
350 LDY &72
360 JSR osbget

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```

370 BCS error \ End of file
380 LDY #0
390 CMP (&70),Y
400 BNE error2 \ Bad Byte error
410 LDA &70
420 CLC
430 ADC #1
440 STA &70
450 LDA &71
460 ADC #0
470 STA &71
480 JMP loop
490 .error
500 LDX #25
510 JSR message
520 JMP close
530 .error1
540 LDX #28
550 JSR message
560 RTS
570 .error2
580 LDX #41
590 JSR message
600 .close
610 LDA #0
620 LDY &72
630 JSR osfind
640 RTS
650 .message

```

```

660 LDA msg,X
670 CMP #13
680 BEQ out
690 JSR &FFEE
700 INX
710 JMP message
720 .out
730 JSR &FFEE7
740 LDA #7
750 JSR &FFEE
760 RTS
770 .block
780 NOP
790 NOP
800 NOP
810 NOP
820 NOP
830 .msg
840 J
850 NEXT
860 $PZ=""
870 $(PZ+10)="Input Filename"
880 $(PZ+25)="OK"
890 $(PZ+28)="No such file"
900 $(PZ+41)="Verify error ?"
910 PRINT TAB(12,0)"VERIFY UTILITY"
920 PRINT TAB(8,2)"(c) 1984 The Micro User"
930 PRINT TAB(12,4)"by Mark Smiddy"
940 PRINT "Call with""CALL PAGE-256
   ""OR""CALL &";~PAGE -256
950 PRINT "SAVE M/C COPY WITH"
   "SAVE ""VERN/C"" ";~PAGE -256;
   " ";~PZ+57

```

This listing is included in this month's cassette tape offer. See order form on Page 169.

SPECIAL OFFER FROM VIGLEN

**THE OUTSTANDING
TEAC DISK DRIVE**

Complete Disk System for the BBC Model B

- Package assumes you own a BBC Model B with switched-mode power supply plus 1.2 operating system

Offer includes:

- Disk Interface (call at factory for free fitting)
- 100k TEAC 55 Series Slimline Disk Drive including case and all leads
- User Guide
- Formatting Disk

Viglen
COMPUTER SUPPLIES

Unit 7 Trumpers Way
Hanwell W7 2QA
Telephone: (01) 843 9903



**DISK DRIVE
AND INTERFACE
£229 INC. VAT**

Post to: VIGLEN COMPUTER SUPPLIES UNIT 7, TRUMPERS WAY, HANWELL, W7 2QA

Please send me (state number required)

I enclose Cheque/P.O. for £

I prefer to pay ACCESS/BARCLAYCARD (Delete whichever not applicable) Card No.

Signature _____

Name _____

Address _____

made out to VIGLEN COMPUTER SUPPLIES (please add £8 for carriage)

THIS ADVERTISEMENT DESIGNED AND PRODUCED BY GMGRAPHICS, HARROW-ON-THE-HILL, MIDDLESEX. TELEPHONE: 01-864 0640



NIGEL PETERS advises . . .

How to use the DFS commands

SO you've finally got up the nerve and spent £300 on a DFS and disc drive. Now you've got them, how do you use them?

Well let's have the DFS come to your rescue. Type in *HELP DFS, press Return, and you'll see Table I come up on the monitor.

These are the DFS commands that I'll be concentrating on in this article.

I'll be ignoring normal OS commands such as *SPOOL and *SAVE and refer you to the User Guide for explanations of them.

To return to the DFS commands, you'll notice that each of the capitalised keywords like DELETE and RENAME has one or more arguments following it.

An "argument" in this context is just an additional piece of information needed by the command, and not what happened when you explained to your dear ones how much it all cost.

They're fairly self explanatory and I'll deal with each as they come up.

For the present let's just take a disc that we've formatted (with the aid of the formatter that came with the DFS) and see how it is configured.

Put a disc (any disc at all) into DRIVE 0. If you've got double drives this is usually the left hand one. If you've only got one drive then DRIVE 0 is the one you've got.

Now enter *CAT 0 and something like Figure I will appear on the display. I say "something like" because there is no

guarantee that it will be identical.

However if it's a blank disc that's just been formatted it won't be too different, if at all.

What we now have is the catalogue of

(10)	
Drive 0	Option 0 (off)
Directory :0.\$	Library :0.\$

Figure I

the disc which tells us how the disc is configured and what is on it.

The top left item is the name of the disc. At the moment it hasn't got one but we'll remedy that later.

"Drive" is straightforward. It's the number of the drive that the disc is in. "Option" and "Library" we'll leave until later, and for the present we'll concern ourselves with "Directory".

As you'll probably already know, you LOAD and SAVE on disc in just the same way you used to do on tape.

However, on disc you're confined to only 31 files. These can have names of up to seven letters, and it can be very frustrating trying to think up meaningful names for your programs.

You tend to end up with PROG1, PROG2, and so on.

The DFS gives you a way of collecting similar programs in groups in the form of directories.

A directory is merely a single letter (or the dollar sign) placed before the program name. In effect, this is an index letter and is used to group similar programs under one prefix.

To see what I mean, type in a program - anything at all - and save it on your newly formatted disc. If you

call it FRED and then *CAT 0 you'll see that the program appears on the catalogue as in Figure II. And, even though it isn't shown, it has a directory symbol.

The reason that you don't see it is that it is the default directory that's in operation. This is the directory that prefixes all the program names with the dollar sign.

If you look at the catalogue heading you'll see that it tells you that the \$ directory is in operation.

Saving a program while that directory is in operation automatically gives it \$ as an index.

However it doesn't bother showing it in front of the filenames when you *CAT. After all, the heading tells you that you're in the \$ directory - there's no need to repeat the information in front of every file.

If you wanted you could try

(11)	
Drive 0	Option 0 (off)
Directory :0.\$	Library :0.\$
FRED	

Figure II

LOADING \$.FRED. The DFS knows exactly what you mean and will do it, even though you only saved FRED. Similarly you could save another program \$.DICK and when you *CAT 0 it will just be shown as DICK.

Now you're not stuck with that directory - you can save programs under any of the 27 available. You could, if you wanted, save another program A.DICK.

The micro won't mind that the name

DFS 0.90
ACCESS <afsp> (L)
BACKUP <src drv> <dest drv>
COMPACT ((drv))
COPY <src drv> <dest drv> <afsp>
DELETE <fsp>
DESTROY <afsp>
DIR ((dir))
DRIVE ((drv))
ENABLE
INFO <afsp>
LIB ((dir))
RENAME <old fsp> <new fsp>
TITLE <title>
WIPE <afsp>

Table I

is the same as the previous program you saved as the two programs are in different directories.

Try it and see. Notice how when you *CAT 0 you get the A directory shown with the later DICK. The DFS always shows the directory of a file if it isn't the default directory.

We'll cover how to change the default directory later, but for the time being let's stick with \$. This is the one the DFS uses when you switch on, or after a Break.

Another default that you may have noticed if you have two drives is that when the micro is switched on or after Break is pressed it always goes to drive 0. This is the default drive.

If you want to work with drive 1 as the DFS's first choice then enter *DRIVE 1. To go back to drive 0 enter *DRIVE 0 or, more drastically, press Break.

Now that you know how to get to drive 1 you probably want to know how to catalogue it. As you might guess, you just enter *CAT 1. If you're lazy like me you can use abbreviations.

To catalogue the disc in drive 0 you use *.0 and for drive 1 you use *.1 as you might have guessed. Just typing in *. will catalogue the disc that's in the default drive.

So we've got our discs which we save to and load from in the usual manner. We can also see what files are on them and know about directories.

The trouble is that they get full up quite quickly as only 31 files are allowed.

How do we get rid of what we don't want?

Well, there are five ways of doing it, three intentionally and two unintentionally!

If you just want to get rid of a track you can use the *DELETE command with the name of the track you want to get rid of. In the case of FRED you would enter *DELETE FRED. This will delete the file straight away.

You could also use *WIPE FRED to get rid of FRED. This gives you a safety margin in that it asks you whether you really want to get rid of FRED. Pressing anything other than Y results in FRED not being wiped.

Another feature that WIPE has which *DELETE doesn't is that it allows the use of "wild cards". These allow you to substitute # or * for parts of a file name.

If you then operate on that pseudo filename the DFS will supply all the filenames that fit the wild cards.

It's much easier to understand with an example. Try saving a few programs on disc with similar names such as PROG1, PROGTWO, PROGOFF.

To get rid of them we could use *DELETE or *WIPE three times but using wild cards allows *WIPE PROG* to do it. The DFS will then question us for each filename, allowing us to select which files are erased and which remain.

As we've mentioned, there are two wild cards, # and *. The hash sign, #, represents just one character of the file name while the star, *, represents all the letters to the end of the file name.

Let's use a wild card to get rid of all the various PROGs. We enter *WIPE PROG*. The DFS will now go through all the PROGs on the disc and give us the option of wiping them.

As you can see from this the wild cards can save a lot of typing and time. You can use wild cards with any of the DFS commands in Table I that have a fsp after them.

They also come in useful where there are several programs with the same name on different directories. Save some programs such as A.PROG, F.PROG, K.PROG. You get the choice of deleting them all with *WIPE #.PROG.

In other words, we've used a wild card to represent the directory letter. If you want to take this to its limit then try *WIPE #.* and see what happens.

As if all this isn't enough there is yet another way to get rid of unwanted files. This is the use of *DESTROY.

You use *DESTROY when you want to get rid of a group of files such as the PROGs we met before. What you do is type in *ENABLE (which is a sort of safety catch) and then enter *DESTROY PROG*. If you make a mistake then you have to *ENABLE again before the DFS will allow you to *DESTROY.

Using *DESTROY with a wild card will result in the DFS listing all the files on the disc that fit the bill and asking "Delete Y/N". If you answer "Y" then the lot will go.

This is in contrast to *WIPE with a wild card which gives you the erase option on each file.

With *DESTROY it's all too easy to get rid of a wanted file along with the unwanted ones. For this reason I stick

to *WIPE. I still make mistakes, though!

As mentioned previously there are two other ways you can get rid of files on a disc and it nearly always happens when you don't want it to.

The first is to format the disc. This will destroy all the files on it.

The second is to use the *BACKUP command which produces a duplicate of a disc. To do this you use *ENABLE (the safety catch) and then *BACKUP followed by the appropriate drive numbers.

If you were copying the disc on drive 0 to the disc on drive 1 you would enter *BACKUP 0 1. If you just have a single disc drive you would use *BACKUP 0 0 and the DFS will prompt you when to put in the source disc and the destination disc.

The trouble with *BACKUP is that if you're careless and mix up the source and destination discs you can end up with a perfect copy of a blank disc.

Also this command can use part of the micro's memory and cause you to lose whatever was in it — usually a vital Wordwise file in my case.

A milder form of *BACKUP is *COPY, which is used to copy a file from one disc to another. *BACKUP copies everything from one disc to another whereas *COPY only makes a copy of one file.

It can however use the micro's memory so, as with *BACKUP, beware if you've got anything important in it.

*COPY is simple to use. To create a copy of FRED you just use something like *COPY 0 1 FRED which copies the file FRED, which is on the disc in drive 0, to the disc in drive 1.

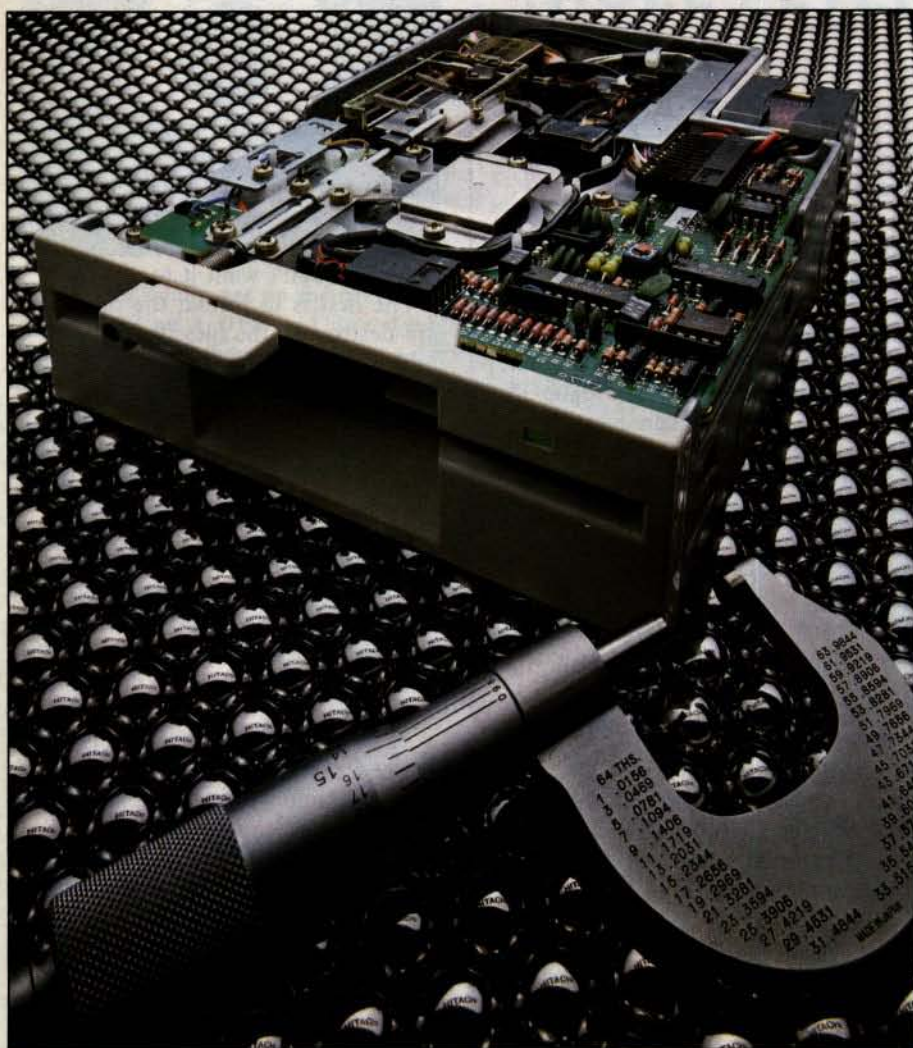
As it only copies FRED, not deleting the original, you end up with two FREDs, one on each disc.

If you only have one drive then *COPY 0 0 FRED will do the job for you, the micro prompting you when you have to put in the appropriate disc.

Having told you all these ways of destroying files, you might wonder if there was any way of protecting them, as they do seem rather vulnerable.

The obvious way is to put a write protect tab over the notch on the disc. This will physically stop the DFS altering the disc. The trouble is that it's not selective, all the files on the disc

HI-TECH MEANS HITACHI.



If you thought that all Floppy Disc Drives were alike – you'd be mistaken.

The HITACHI range stands out

- * High in reliability
- * Technically advanced
- * Fully compatible with BBC Units.

5¼" – All 5¼" drives are half height and have an access track of 3 or 5 ms.

3" – Amazing new 3" drive with hard case diskette, fast 3 ms track to track.

All drives have a 12 month warranty.

Code	(Uncased)	Price inc VAT
HF 001	3" single sided 100/200K	178.25
HF 002	3" double sided 200K	195.50
HF 004	5¼" double sided 200K	201.25
HF 005	5¼" double sided 400K	224.25
	(Cased with leads & Utility discs)	
HF 008	3" single sided 100K	212.75
HF 009	3" double sided 200K	258.75
HF 010	5¼" double sided 200K	252.65
HF 011	5¼" double sided 400K	296.75
HF 020	Separate leads (per set)	16.10
HF 021	Separate metal case 3"	9.00
HF 022	Separate metal case 5¼"	9.00
HF 025	3" diskettes	4.95 each
	(Cases match the BBC)	

Dealer enquiries welcome and Quantity prices available. All goods sent overnight carrier (add £6 to order for drives. Add £2 to order for leads or cases).

ALSO AVAILABLE FROM:

RMK Electronics Limited
Hinton House
New Milton
Hants
(0425) 616110

Micro Choice
159 Havant Road
Drayton Portsmouth
Hampshire
(0705) 324934

Silicon Valley Computer Centre
Suite 104-105
16 Baldwins Gardens
Holborn London
(01) 242 2803

Wiltshire Microcentre
Unit 6 General Trading Estate
Signal Way
Swindon, Wilts SN3 1PD
(0793) 612299

ORDER FORM

CODE	QUANTITY	PRICE
HF 001		
HF 002		
HF 004		
HF 005		
HF 008		
HF 009		
HF 010		
HF 011		
HF 020		
HF 021		
HF 022		
HF 025		
Add Carriage		
Total		



To: GSL Computing Ltd., 2 North Way, Andover, Hants SP10 5AZ.

Name _____

Address _____

Phone No. _____

I enclose cheque/PO for £ _____

Signature _____

GSL
Computing

2 North Way
Andover, Hants SP10 5AZ
(0264) 59633

**BBC
MICRO**

DISC DRIVES

CHASE DATA LTD

The exclusive disc drive company,
cut out the middle man to
bring you **BEST PRICES** on
CANON disc drives.

**1 YEAR
WARRANTY
ALL PARTS
& LABOUR**

**110/210 DUAL
DRIVE SYSTEM**

**221 DUAL
DRIVE SYSTEM**

CHASE DATA LTD are pleased to announce the launch of the latest generation of Canon disc drives – the ultra slim model 221 (double sided 80 track) – **TRULY SUPERB VALUE FOR MONEY**

All inclusive means

Disc drive + case + all power and data cables + U.K. carriage + utilities disc & manual + V.A.T.

Quality product

State of the art disc drives. E.g. Model 221 features: unique on-board switching that both reads **and writes** in 40/80 TK modes

Full service support

Our units come with a full 1 year warranty on parts & labour. Disc drive service is via the leading U.K. Independent Drive Service Company.

Send remittance (Cheque only please) with your order to:

CHASE DATA LTD

P.O. Box 6, Woking, Surrey GU21 4PB. (Tel: 0784 38487).

All inclusive price list

MODEL	110	210	221
FORMATTED CAPACITY OF SINGLE DRIVE ON BBC MICRO	100K	200K	400K
SINGLE DRIVE IN CABINET	£170	£198	£236
DUAL DRIVE IN CABINET	£320	£370	£437

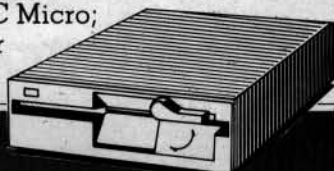
All units available with on-board power supply.
Additional cost: £25.

Now you can add the very latest
5¼ inch, half height disk drives
from TEAC to your BBC Model 'B'.

SINGLE DRIVES

FD-55A-9409, 100KB, 40 TRACK S.S. £182
FD-55B-9410, 200KB, 40 TRACK D.S. £234
FD-55E-9411, 200KB, 80 TRACK S.S. £217
FD-55F-9412, 400KB, 80 TRACK D.S. £258

Powered by the BBC Micro;
no additional power
supply needed.



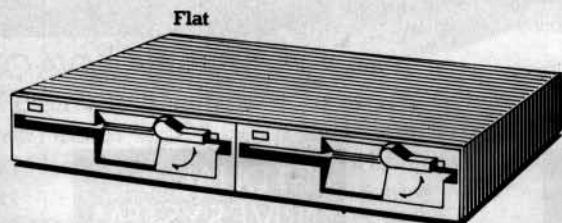
FEATURES

- ☐ LSI Circuitry
- ☐ Fewer mechanical parts
- ☐ Lower power consumption (4.9W)
- ☐ Metal case minimises RFI
- ☐ 12 Months warranty
- ☐ All cables supplied

ALSO AVAILABLE

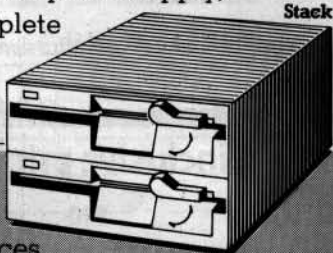
Enquire for full details of our range of TEAC
Twin Drives.

TWIN DRIVES



From £343 (without power supply)

From £428 (complete
with integral
switched-mode
power supply)



ORDERING

To order, add
VAT to above prices
and send your remittance. Alternatively, order
by telephone quoting your Barclaycard/Access
number. Carriage and packing free.

Enquiries from Dealers and Education
Authorities welcomed.

2a Green Street
Sandbach
Cheshire
CW11 9AX



MAIL ORDER MICROS

Telephone 0782 811711

CARSON DEVELOPMENTS

New stocks arrived
Previous offer now repeated

**FULL HEIGHT
40 TRACK DISC DRIVES
CASED & CABLED FOR £100**

DISKETTES

	WABASH	DATALIFE	VEREX
40 Trk SS.SD	£14.00		£14.00
40 Trk SS.DD		£17.00	
40 Trk DS.DD	£17.50	£24.00	
80 Trk DS.DD	£23.00	£28.00	

£1 post and packing; 3 or more boxes are post free; discount
on quantity.

DISC INTERFACE KITS: Single density £85; double density
£99; double density DFS £79.

DISC DRIVES

	Bare	Cased and cabled	Dual cased and cabled
40 Trk SS	£125	£140	£280
40 Trk DS	£155	£170	£340
80 Trk DS	£210	£215	£400

Power supply at £35

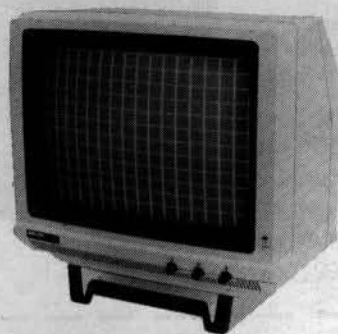
Format disc and user guide £5. Carriage on drives £10.

Please add VAT to all prices.
Dealer enquiries invited.



CARSON DEVELOPMENTS (MU)
84 Highfield Road, Romford, Essex,
RM5 3RU.

Telephone: 0708 27043



Philips Video Display TP 200

DESCRIPTION

The monochrome Video
terminal TP 200 is
intended for use as a
computer data display
suitable for connection to a
wide range of equipment.

Applications include:

- personal computers
- business computers
- control systems
- automatic test equipment.

The picture quality of the

TP 200 means that not
only 80 column x 24 lines
of information can be
displayed but the monitor
may also be used for high
resolution graphics.
»Designed in» reliability
and Philips quality
assurance combine to
provide long term trouble
free definition performance.

PRICE £69.95

+ VAT and £6 delivery (lead £3.20)

K N DEVELOPMENTS

20 Harebell Close, Shawclough, Rochdale

Tel: Rochdale (0706) 43869

From Page 89

being shielded whether or not they are important.

To get around this the DFS has the ***ACCESS** command which allows you to lock a file. Suppose you had a file **HARRY** that you didn't want deleted. You could lock it with ***ACCESS HARRY L** and then ***DELETE**, ***DESTROY** and ***WIPE** won't touch it.

Sadly it won't protect against formatting and ***BACKUP**.

To unlock **HARRY** you just use ***ACCESS HARRY**, that is, you leave off the **L**. You'll see from the DFS command list that ***ACCESS** can be used with wild cards. ***ACCESS *.* L** will lock a whole disc. As you might guess ***ACCESS *.* *** will unlock every file on a disc.

Locking a file will also stop you from renaming it with the self explanatory ***RENAME**.

If we wanted to rename a locked file **HARRY** with the new name **TOM** we would have to unlock it with ***ACCESS HARRY** then use ***RENAME HARRY TOM**.

It's quite simple to use and can help keep discs tidy and orderly.

You might have found, with all these programs going on your disc, that you've been running out of room to store things.

One way around this is to ***COMPACT** the disc. This tidies it up and releases extra space for new files.

To compact the disc on drive 0 you use ***COMPACT 0**. While this is happening the DFS displays the information about each file's structure.

Beware though, for like ***BACKUP** and ***COPY**, ***COMPACT** can corrupt what is already in the micro's memory.

The information displayed for all the files when you ***COMPACT** can also be gained by using ***INFO**.

To get the information about a file **HARRY** you just use ***INFO HARRY**

```
$HARRY L FF1900 FF8023 00000D 003
```

Figure III

and the display will tell you whether the file is locked, its load and starting addresses and its length. Figure III shows how it's displayed.

During the normal course of events the DFS won't display this information about a file. You can, however change

this by entering ***OPT 1 1**.

Now the file details will be displayed everytime it is used, rather like an automatic ***INFO**. To stop this just enter ***OPT 1 0** and things return to normal.

To finish this tour of the DFS commands let's take a look at the catalogue again by entering ***CAT** (as my tabby is known).

Remember I said we could give a disc a name. To do this we use ***TITLE**. The name can be up to 12 letters long.

To name the disc in the current default drive **EXAMPLE** all we do is type in ***TITLE "EXAMPLE"** and press Return. Now enter ***** and you'll see the name.

I also said that we could change the default directory of a disc. Usually it's **\$** but if we wanted (for reasons best known to ourselves) to change it to **A** we would enter ***DIR A** which makes the default directory **A**. Any programs we now save onto the disc will have the

```
EXAMPLE (15)
Drive 0          Option 0 (off)
Directory :0.$   Library :0.$

FRED             HARRY L
```

Figure IV

directory **A** (unless we do something about it).

Now the **A** won't show when you ***CAT**. This is because the default directory never does. What does happen is that files which were saved when **\$** was the default directory magically appear with **\$** in front of them when you ***CAT** after a change of directory.

Figure IV shows the catalogue of a disc named **EXAMPLE**. The default directory is **\$**, the usual one after switching on or pressing Break.

Figure V shows the result of changing the default directory to **X** with ***DIR X** and saving a couple of more programs. You'll see that the previous programs now show their **\$** directory.

The programs recorded under the new default, **X**, don't show their directory.

Now try entering another default directory, say ***DIR Z**, and you'll see the files with both **\$** and **X** directories as in Figure VI.

The point to remember is that the proper name of each file always includes the directory it was saved under. It just

YEAR OF THE DISC



so happens that if it is the default directory it doesn't appear on the catalogue.

As you've seen, we can have files on

```
EXAMPLE (17)
Drive 0          Option 0 (off)
Directory :0.X   Library :0.$

DICK             TOM

$.FRED           $.HARRY L
```

Figure V

the disc with different directories and we can save and load programs with their full name such as **A.PROG1** or **\$.PROG2**.

In fact, if the default directory of a disc is different from the directory of the file we want to load, we have to give it its full name or the DFS says it's not on the disc.

If you don't follow that then try saving a program **A.GEORGE** on a disc where **\$** is the default. Now try to load **GEORGE** from that disc and see where you get!

It's not only the directory that you can specify in a filename. You can even choose a drive.

You do this by putting the drive number at the beginning of a filename but after a colon which tells the DFS that the number following specifies a drive.

If you wanted to save a program **EILEEN** on the disc on drive 1 with the

```
EXAMPLE (17)
Drive 0          Option 0 (off)
Directory :0.Z   Library :0.$

$.FRED           $.HARRY L
X.DICK           X.TOM
```

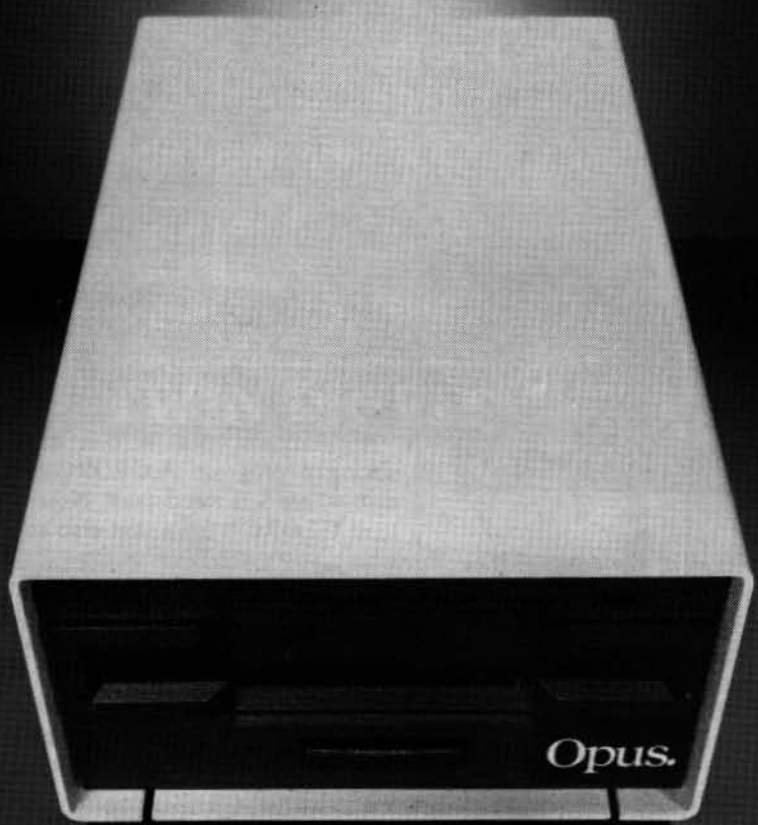
Figure VI

directory **A** then you would SAVE **":1.A.EILEEN"**. Try it and see.

The good thing about this is that you can use the non-default drive without having to type in ***DRIVE 1** and

— Turn to Page 99

A DOUBLE-SIDED 3" DISC DRIVE AT A SINGULAR PRICE.



THE OPUS
SUPER 3 MICRODRIVE.
£229.95 (INC.
VAT)
FOR USE WITH YOUR BBC MICRO.

For only £229.95 (and that includes VAT, and all the necessary leads) you can have an OPUS 500k double-sided disc drive. And remember 3" disc drives are fast becoming the standard for home and business use.

This is an even bigger bargain than it sounds. For you're getting a double sided drive at the price that other company's sell single sided drives for. It reads and writes to the disc cartridge from both sides, giving you twice the on-line capability of other 3" drives. And there's no need to flip the disc over!

STATE OF THE ART TECHNOLOGY FEATURING:

- Easy to connect to the BBC Micro
- Compatible with most other makes
- Comprehensive manual
- Free disc cartridge
- Format, verify and other utilities provided
- Direct Drive
- Double sided
- One touch cartridge load
- 3 ms access time
- Portable, compact and reliable
- One year's full guarantee
- Totally compatible with 5¼" drives

TECHNICAL PERFORMANCE.

	Single Density	Double Density
Capacity	250K Bytes	500K Bytes
Recording density	4,915 BP1	9,830 BP1
Track density	100 TP1	100 TP1
Total number of tracks	40 (each side)	40 (each side)
Recording method	FM	MFM
Rotational speed	300 RPM	300 RPM
Transfer rate	125K Bits/Sec	250K Bits/Sec
Access time track to track	3 ms	3 ms
Access time settling	20 ms	20 ms
Motor start time	0.5 sec	0.5 sec

The Opus Super 3 Microdrive is now available from W. H. Smith's and leading specialist shops. Dual disc drives are also available for £460.

OPUS SUPPLIES LTD.

158 Camberwell Road, London SE5 0EE.
Opening hours: 9.00-6.00 Monday-Friday, 9.00-1.30p.m. Saturday. ☎ 01-701 8668
01-703 6155

To: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Please rush me the following: (ALL PRICES INCLUDE VAT & CARRIAGE.)

Quantity	Description	Price
	Single drive(s) at £229.95 ea.	
	Dual drive(s) at £459.95 ea.	
TOTAL		

I enclose a cheque for £
Or please debit my credit card account with the amount of £
My Access/Barclaycard (please tick) No. is

Name
Address

Telephone

Opus.
Opus Supplies Ltd.

Drives of the future



Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.

The Pace range of drives include drives which are switchable between 40 and 80 tracks. As these drives are double sided they give a massive 400 k per drive in 80 track mode, whilst in 40 track mode they retain compatibility with Acornsoft and other

commercially available software. These drives feature colour LED's to indicate operation.

All Pace drives are capable of being used as double density drives so that, as and when, a double density filing system and interface become available, the disc storage capacity will be doubled (eg. the dual 40/80 drive will have an unbelievable 1.6m of storage).

Pace disc drives are designed to run off the BBC power supply and are supplied complete with all cables, a utilities disc and manual.

PACE
Disc Systems

92 NEW CROSS STREET,
Bradford BD5 8BS.
Tel: (0274) 729306
Telex: 51564 SHAREY-133



Dealer enquiries welcome

Disc drives available:-

SINGLE DRIVES

	ex VAT	inc VAT
PSD1 Single Sided 40 Track (100k)	£185	£212.75
PSD2 Double Sided 40 Track (200k)	£235	£270.25
PSD3 Double Sided 40 80 Track (400k)	£305	£350.75
PSD4 Double Sided 80 Track Only (400k)	£285	£327.75
PSD5 Single Sided 40 80 Track (200k)	£235	£270.25

DUAL DRIVES

	ex VAT	inc VAT
PDD1 Single Sided 40 Track (200k)	£338	£388.70
PDD2 Double Sided 40 Track (400k)	£449	£516.35
PDD3 Double Sided 40 80 Track (800k)	£579	£665.85
PDD4 Double Sided 80 Track Only (800k)	£538	£618.70
PDD5 Single Sided 40 80 Track (400k)	£449	£516.35

Available from good computer stores everywhere including:

Computer City, Widnes, Cheshire. Tel: 051-420-3333. Computerama, Stafford. Tel: 0785-41899. Silicon Centre, Edinburgh. Tel: 031-557-4546. Computerama, Stoke on Trent. Tel: 0782-268620. G.T.M., Leeds. Tel: 0532-647474. Wilding Computer Centre, Wigan. Tel: 0942-44382. National Micro Centre, Stockport. Tel: 061-483-3605. Sir Computers, Cardiff. Tel: 0222-21341. P.J. Microsystems, Crowthorne. Tel: 0344-772351.

The Micro User up-to-the-minute survey of disc drives available for the BBC Micro



Supplier	Tracks	Capacity	Single or Double sided	Integral PSU	Single or Dual	Price (ex VAT)	Size LxHxW (mm)	Drive type
Advanced Memory Systems	40	200k	Double	No	Single	£195.65	90x40x150	Hitachi 3" drive
	40	200k	Double	No	Dual	£346.95	180x40x160	Hitachi 3" drive
Carson Developments	40	100k	Single	*Opt	Single	£140	218x43x147	Tandon
	40	200k	Double	*Opt	Single	£170	218x43x147	Tandon
	80	800k	Double	*Opt	Single	£220	218x43x147	Tandon
	40	200k	Single	*Opt	Dual	£280	218x125x147	Tandon
	40	400k	Double	*Opt	Dual	£340	218x125x147	Tandon
	80	800k	Double	*Opt	Dual	£400	218x125x147	Tandon
Also versions using TEAC and Mitzi								
Chase Data	40	100k	Single	No	Single	£148	146x57x196	Canon
	40	100k	Single	Yes	Single	£170	146x57x196	Canon
	40	200k	Single	No	Dual	£278	146x57x196	Canon
	40	200k	Single	Yes	Dual	£300	146x57x196	Canon
	40	200k	Double	No	Single	£172	146x57x196	Canon
	40	200k	Double	Yes	Single	£194	146x57x196	Canon
	40	400k	Double	No	Dual	£322	146x57x196	Canon
	40	400k	Double	Yes	Dual	£343	146x57x196	Canon
	40/80	400k	Double	No	Single	£205	146x33.5x215	Canon
	40/80	400k	Double	Yes	Single	£227	146x33.5x215	Canon
	40/80	800k	Double	No	Dual	£380	146x33.5x215	Canon
	40/80	800k	Double	Yes	Dual	£402	146x33.5x215	Canon
Computer Village	40	100k	Single	No	Single	£168	258x59x152	Shugart
	40	200k	Single	No	Dual	£295	258x89x152	Shugart
	40/80	400k	Double	No	Single	£230	258x47x152	Shugart
	40/80	800k	Double	No	Dual	£275	258x90x152	Shugart

Supplier	Tracks	Capacity	Single or Double sided	Integral PSU	Single or Dual	Price (ex VAT)	Size LxHxW (mm)	Drive type
MW Systems	40/80	800k	Double	Yes	Dual	£399	419x51x375	Toshiba
	40/80	400k	Double	Yes	Single	£233	419x51x375	Toshiba
	40	200k	Double	No	Single	£159	254x51x146	Seiko
Oakleaf	40	100k	Single	No	Single	£163	218x51x147	Shugart (Chinon)
	40	100k	Single	No	S/expandable	£163	218x102x147	Shugart (Chinon)
	40	200k	Single	No	Dual	£260	218x102x147	Shugart (Chinon)
	80	800k	Double	No	Dual	£500	218x83x147	Shugart (Chinon)
Opus	40	100k	Single	No	Single	£149.48	229x44x152	Various
	40	2x100k	Single	Yes	Dual	£323.39	305x88x152	
	40	200k	Double	No	Single	£192.95	229x44x152	
	40	2x200k	Double	Yes	Dual	£392.95	305x88x152	
	40/80	400k	Double	No	Single	£253.82	229x44x152	
	40/80	2x400k	Double	Yes	Dual	£514.69	305x88x152	
	40	200k	Double	No	Single**	£192.95	178x38x83	
	40	2x200k	Double	Yes	Dual**	£392.95	178x44x190	
	80	400k	Double	No	Single	£219.04	229x44x152	
	80	2x400k	Double	Yes	Dual	£427.73	305x88x152	
Pace	40	100k	Single	No	Single	£185	218x43x147	TEAC/TEC
	40	100k	Single	No	Dual	£338	218x86x147	TEAC/TEC
	40	200k	Double	No	Single	£235	218x43x147	TEAC
	40	200k	Double	No	Dual	£449	218x86x147	TEAC
	40/80	100/200	Single	No	Single	£235	218x43x147	TEAC
	40/80	100/200	Single	No	Dual	£449	218x86x147	TEAC
	80	400k	Double	No	Single	£285	218x43x147	TEAC
	80	400k	Double	No	Dual	£538	218x86x147	TEAC
	40/80	200/400	Double	No	Single	£305	218x43x147	TEAC
	40/80	200/400	Double	No	Dual	£538	218x86x147	TEAC
	40/80	200/400	Double	No	Single	£305	218x43x147	TEAC
	40/80	200/400	Double	No	Dual	£538	218x86x147	TEAC

Cumana	40	100k	Single	No	Single	£185	241x51x152	TEC
	40	100k	Single	Yes	Single	£199	312x51x152	TEC
	40	100k	Single	Yes	Single	£185	312x51x152	TEC
	80	200k	Single	No	Single	£214	241x51x152	TEC
	80	200k	Single	Yes	Single	£229	312x51x152	TEC
	80	200k	Single	Yes	Single	£213	312x51x152	TEC
	80	400k	Double	No	Single	£245	241x51x152	Mitsubishi
	80	400k	Double	Yes	Single	£259	312x51x152	Mitsubishi
	80	400k	Double	Yes	Single	£249	312x51x152	Mitsubishi
	80	2x100k	Single	Yes	Dual	£345	312x51x152	TEC
	80	2x200k	Single	Yes	Dual	£389	312x51x152	TEC
	80	2x400k	Double	Yes	Dual	£469	312x51x152	Mitsubishi
GSL	40/80	2x200k	Single	Yes	Dual	£469	300x125x200	TEC
	40/80	2x400k	Single	Yes	Dual	£525	300x125x200	Mitsubishi
	40	100k	Single	No	Single	£149.95	216x64x146	Shugart
	40	100k	Single	No	Dual	£298	216x128x146	Shugart
	80	200k	Single	No	Single	£240	229x38x146	Shugart or TEAC
	80	200k	Single	No	Dual	£480	229x76x146	Shugart or TEAC
	80	400k	Double	No	Single	£280	229x38x146	Shugart or TEAC
	80	400k	Double	No	Dual	£560	229x76x146	Shugart or TEAC
	40	100k	Single	Yes	Single	£191	279x38x146	Cumana
	40	100k	Double	No	Single	£180	279x44x83	Hitachi 3" drive
	40	100k	Double	No	Dual	£360	178x88x83	Hitachi 3" drive
	40	2x100k	Double	No	Single	£167.28	124x73.5x152	Hitachi
	Power supply is £25.93 extra							Nat. Panasonic
Kaydee	40	100k	Single	No	Single	£169	218x43x147	TEAC
	40	100k	Single	Yes	Single	£205	218x43x147	TEAC
	40	200k	Double	No	Single	£230	218x43x147	TEAC
	40	200k	Double	Yes	Single	£266	218x43x147	TEAC
	80	200k	Single	No	Single	£230	218x43x147	TEAC
	80	200k	Single	Yes	Single	£266	218x43x147	TEAC
	80	400k	Double	No	Single	£290	218x43x147	TEAC
	80	400k	Double	Yes	Single	£326	218x43x147	TEAC
	40	2x100k	Single	No	Dual	£304	218x43x294	TEAC
	40	2x100k	Single	Yes	Dual	£340	218x43x294	TEAC
	80	2x200k	Single	No	Dual	£365	218x43x294	TEAC
	80	2x200k	Single	Yes	Dual	£401	218x43x294	TEAC
LVL	80	2x400k	Double	No	Dual	£520	218x43x294	TEAC
	80	2x400k	Double	Yes	Dual	£556	218x43x294	TEAC
	40	2x100k	Double	No	Single	£195	90x40x150	Hitachi
	40	100k	Single	No	Single	£230.43	305x76x127	Shugart
	40	200k	Single	No	Dual	£338.26	305x76x127	Shugart
	40	200k	Single	Yes	Dual	£359.57	305x76x127	Shugart
	40	400k	Double	No	Dual	£499	305x76x127	Shugart
	40	100k	Single	No	Single	£129.57	210x83x146	3" drive
	45	100k	Single	No	Dual	£216.53	210x83x146	3" drive
	40	100k	Single	No	Single	£153	218x43x147	Shugart (Chinon)
	40	100k	Single	No	S/expandable	£160	218x43x294	Shugart (Chinon)
	40	100k	Single	No	Dual	£291	218x43x294	Shugart (Chinon)
	40/80	400k	Single	No	S/expandable	£264	218x43x294	Mitsubishi
Micro Resources	40/80	400k	Single	No	Dual	£479	218x43x294	Mitsubishi
	40	100k	Single	Yes	Single	£173	218x43x147	Shugart (Chinon)
	40	100k	Single	Yes	S/expandable	£180	218x43x294	Shugart (Chinon)
	40	100k	Single	Yes	Dual	£311	218x43x294	Shugart (Chinon)
	40/80	400k	Single	Yes	S/expandable	£284	218x43x294	Mitsubishi
	40/80	400k	Single	Yes	Dual	£499	218x43x294	Mitsubishi
	40	100k	Single	No	Single	£153	218x43x147	Shugart (Chinon)
	40	100k	Single	No	S/expandable	£160	218x43x294	Shugart (Chinon)
	40	100k	Single	No	Dual	£291	218x43x294	Shugart (Chinon)
	40/80	400k	Single	No	S/expandable	£264	218x43x294	Mitsubishi
	40/80	400k	Single	No	Dual	£479	218x43x294	Mitsubishi
	40/80	400k	Single	Yes	Single	£173	218x43x147	Shugart (Chinon)
	40/80	400k	Single	Yes	S/expandable	£284	218x43x294	Mitsubishi
Midwich	40/80	400k	Single	Yes	Dual	£499	218x43x294	Mitsubishi

Techno-matic	40	100k	Single	No	Single	£150	254x44x152	TEAC
	40	2x100k	Single	Yes	Dual	£320	279x121x229	TEAC
	40/80	200k	Single	No	Single	£180	254x44x152	TEAC
	40/80	2x200k	Single	Yes	Dual	£400	279x121x229	TEAC
	80	1x400k	Double	No	Single	£195	254x44x152	Mitsubishi
	80	2x400k	Double	Yes	Dual	£420	279x121x229	Mitsubishi
	80	400k	Double	Yes	Dual	£730†	415x70x370	Mitsubishi
	40	100k	Single	No	Single	£146.95	New Slimline	TEAC
	40	100k	Single	Yes	Single	£181.95	New Slimline	TEAC
	40	100k	Single	No	Dual	£286.95	New Slimline	TEAC
	40	100k	Single	Yes	Dual	£321.95	New Slimline	TEAC
	40/80	200k	Single	No	Single	£191.30	New Slimline	TEAC
	40/80	200k	Single	Yes	Single	£226.30	New Slimline	TEAC
Twillstar	40/80	200k	Single	No	Dual	£382.60	New Slimline	TEAC
	40/80	200k	Single	Yes	Dual	£417.60	New Slimline	TEAC
	40/80	400k	Double	No	Single	£233.91	New Slimline	TEAC
	40/80	400k	Double	Yes	Single	£268.91	New Slimline	TEAC
	40/80	400k	Double	No	Dual	£468	New Slimline	TEAC
	40/80	400k	Double	Yes	Dual	£503	New Slimline	TEAC
	80	400k	Double	No	Single	£233.91	New Slimline	Mitsubishi
	80	400k	Double	Yes	Single	£268.91	New Slimline	Mitsubishi
	80	400k	Double	No	Dual	£468	New Slimline	Mitsubishi
	80	400k	Double	Yes	Dual	£503	New Slimline	Mitsubishi
	40	100k	Single	No	Single	£146.95	New Slimline	Komori (Chinon)
	40	100k	Single	Yes	Single	£181.95	New Slimline	Komori (Chinon)
Viglen	40	100k	Single	No	Dual	£286.95	New Slimline	Komori (Chinon)
	40	100k	Single	Yes	Dual	£321.95	New Slimline	Komori (Chinon)
	40	100k	Single	No	Single	£139.20	235x46x150	TEAC
	40	100k	Single	Yes	Single	£167.20	295x46x150	TEAC
	40	200k	Single	No	Dual	£278.40	235x92x150	TEAC
	40	200k	Single	Yes	Dual	£306.40	295x92x150	TEAC
	40	200k	Double	No	Single	£200	235x46x150	TEAC
	40	200k	Double	Yes	Single	£228	295x46x150	TEAC
	40	400k	Double	No	Dual	£400	235x92x150	TEAC
	40	400k	Double	Yes	Dual	£428	295x92x150	TEAC
	40/80	200k	Single	No	Single	£173	235x46x150	TEAC
	40/80	200k	Single	Yes	Single	£201	295x46x150	TEAC
	40/80	400k	Single	No	Dual	£346	235x92x150	TEAC
Walters	40/80	400k	Single	Yes	Dual	£374	295x92x150	TEAC
	40/80	400k	Double	No	Single	£217.39	235x46x150	TEAC
	40/80	400k	Double	Yes	Single	£245.39	295x46x150	TEAC
	40/80	800k	Double	No	Dual	£434.78	235x92x150	TEAC
	40/80	800k	Double	Yes	Dual	£462.78	295x92x150	TEAC
	40	200k	Double	No	Single	£160.86	35 mm high	Canon
	40	200k	Double	Yes	Single	£188.86	46 mm high	Canon
	40	200k	Double	No	Dual	£321.72	70 mm high	Canon
	40	200k	Double	Yes	Dual	£349.72	70 mm high	Canon
	40/80	400k	Double	No	Single	£200	46 mm high	Canon
	40/80	400k	Double	Yes	Single	£228	46 mm high	Canon
	40/80	800k	Double	No	Dual	£370	70 mm high	Canon
Watford *	40/80	800k	Double	Yes	Dual	£399	70 mm high	Canon
	40	100k	Single	No	Single	£181	218x43x147	TEAC
	80	400k	Double	No	Single	£299	218x43x147	TEAC
	40/80	200/400	Double	No	Single	£309	218x43x147	TEAC
	40	100k	Single	No	Single	£139	Slimline	TEAC
	80	400k	Double	No	Single	£188	Slimline	Mitsubishi
	40/80	400k	Double	No	Single	£215	Slimline	Mitsubishi
	80	800k	Double	No	Dual	£375	Slimline	Mitsubishi
	40/80	800k	Double	No	Dual	£385	Slimline	Mitsubishi
	80	400k	Double	Yes	Single	£275	Slimline	Mitsubishi
	80	800k	Double	Yes	Dual	£499	Slimline	Mitsubishi

*Opt = optional integral PSU = £35

◊NOT including formatting diskette, drive connecting cable and user manual.

40/80 means the drive is switchable between 40 and 80 tracks

† Including Z80 and power supply and CP/M and software

40/80 means the drive is switchable between 40 and 80 tracks

★ Plus full range of Cumana drives

** 3" drives

mw systems OFFER YOU

A FULL RANGE OF FLOPPY DISC SYSTEMS FOR THE BBC MICRO

- ☐ **Disc Drive Units** are cased in high quality steel boxes, finished in a matching BBC colour.
- ☐ **All Units** come complete with manual, formatting disc and appropriate cables.
- ☐ **Optional Power** supply available for Dual 400K.
- ☐ **All Single Units** can be upgraded to a double unit.
- ☐ **All Equipment** is covered by a full 1 year warranty.



800K
for only
£399

MWS 800K (1.6MB) at Double Density.
DUAL DRIVES from Toshiba.
These drives are double sided/double density and are 40/80 Track Switchable.



400K
for only
£233

MWS 400K (800K at Double Density).
SINGLE DRIVE from TOSHIBA.
This drive is also double sided/double density and is 40/80 Track Switchable.

mw systems ltd.

Matrix House
Lincoln Road
Cressex Industrial Est.
High Wycombe
Bucks
Tel (0494) 450341

ORDER FORM

All prices are exclusive of VAT
All Systems are ex-stock
and are despatched by
next day delivery service



200K
for only
£159

**NEW PRODUCT
RELEASE**

MWS 200K.
A SINGLE DRIVE from SEIKO.

This drive is double sided/single density.

Please send me the following items	Quantity	£
Dual 400K Drive Unit (800K) at £399		
Single 400K Drive Unit at £233		
Single 400K Upgrade at £220		
Single 200K Drive Unit at £159		
DFS fitted at £95		
DFS unfitted at £85		
Optional Power Supply for Dual System at £35		

Please debit my
Access/Barclaycard/Amex/Diners

Delivery £10.00

Sub Total

VAT at 15%

Card No.
I enclose a cheque for £..... made payable to
MW Systems

TOTAL

£

Name Company

Address

Tel No

From Page 93

*DRIVE 0 all the time.

Another way to get at programs that are on a disc on the non-default drive is to use *LIB. You'll have noticed something like LIBRARY:0.\$ when you've catalogued a disc and probably wondered what it does.

The library tells the micro what drive and what directory to have a look at if it can't find what it's looking for on the current default drive and catalogue.

Don't worry too much if that doesn't make sense. It will when you try it in practice.

Normally the library is set to drive 0 and the \$ directory. If you've got a Basic program on the disc such as BODGER, under the default directory you'll find that you can now load it with *BODGER.

This is the influence of the library, which is set to the default values. Purists say that you should use *L.BODGER or your micro might crash, but I've

never had any problems.

This can be changed using the *LIB command. Before you do this, however, SAVE a few programs on the disc under another directory, for example, A.KATIE or A.PAUL.

Next change the library to the A directory on drive zero. *LIB:0.A will do this. Now the DFS has another default to look at when you want a program.

The good thing about this is that you can load programs that aren't on the current default directory without messing about changing directories.

Try it. If you want A.KATIE you can load it with *KATIE if it's a Basic program. If it's a machine code program it will actually run it for you as well.

This comes into its own when you've got two drives. You can use the first drive as normal but also you can access the second drive without having to use *DRIVE or LOAD using the full file specifications.

All you have to do is to change the

YEAR
OF THE **DISC**



library option to specify drive 1 and whatever directory you want to get at on that drive. Then just *FRED or whatever will load it from the non-default drive. It saves a lot of time and trouble.

And that's it for this tour of the DFS commands.

You'll notice that I've ignored the "option" part of the catalogue. I'll cover this in a later article when I plan to deal with all the commands you find when you enter *HELP UTILS.

As for now, I'll leave you to format a couple of discs and have fun playing around with the DFS.

It's not half as complicated to use as it is to read about.

There are easier ways of dumping your screen

.. and ERIC CRISP knows one of them

OUR friendly Editor walked up to me the other day and stated: "I want to dump my screen!". "Fine", I responded, "the tip's just down the road".

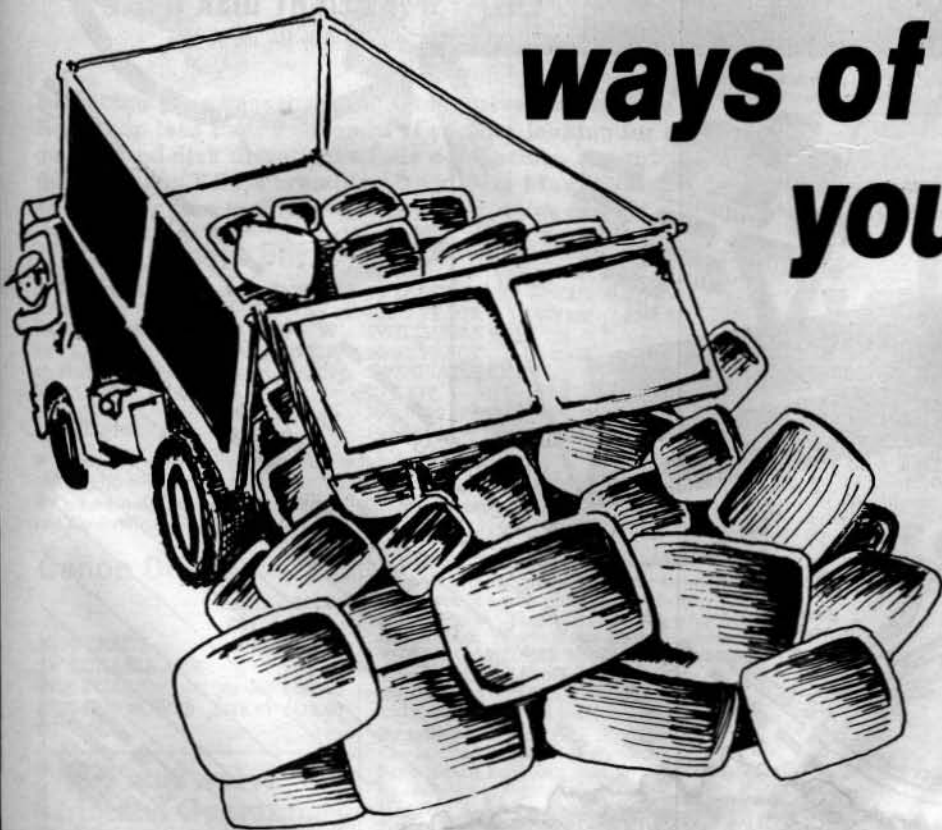
"No!" he said, "I want to dump it on the printer".

"Won't the printer get its ribbon squashed?"

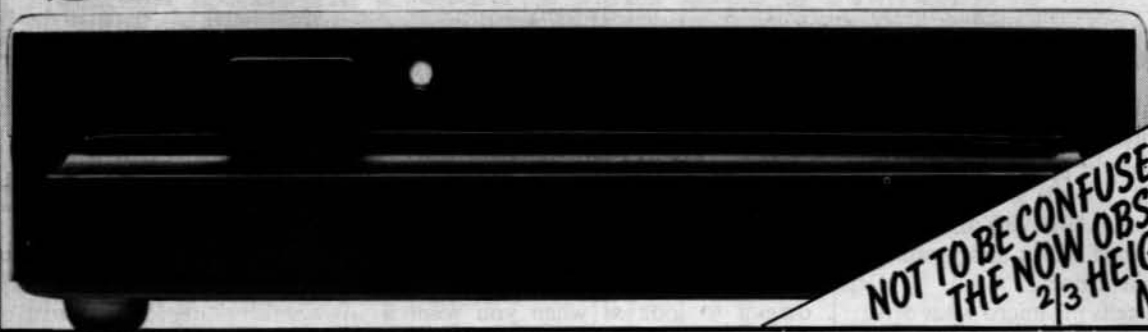
"Idiot!" he screamed, "I want to be able to play a game like Asteroid Miner and then dump the screen onto a printer!"

"Ah!" I sighed, "you want a program

Turn to Page 102



SPECIAL OFFER!



NOT TO BE CONFUSED WITH
THE NOW OBSOLETE
 $\frac{2}{3}$ HEIGHT
MODELS

Latest Model-Super Slim Disk Drive

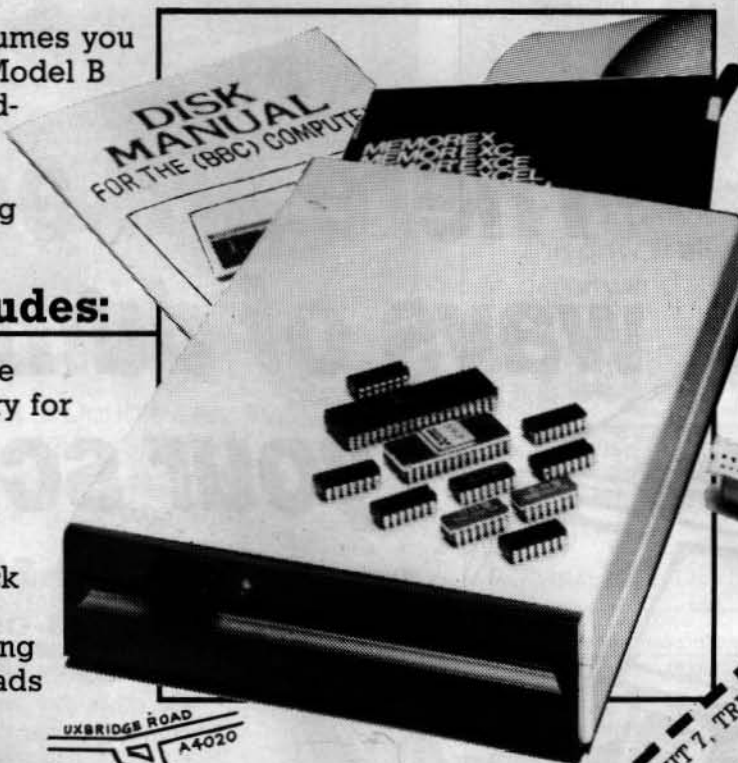
FROM VIGLEN

Complete disk system for the BBC Model B

- Package assumes you own a BBC Model B with switched-mode power supply plus 1.20 operating system

Offer includes:

- Disk Interface (call at factory for free fitting)
- User Guide
- Utilities Disk
- 200K double sided 40 track Canon Disk Drive including case & all leads



£265 INC. VAT

**CANON
SUPER-SLIM
 $\frac{1}{3}$ HEIGHT DISK DRIVE**

Only 1 $\frac{1}{8}$ inches high

Viglen
COMPUTER SUPPLIES

Unit 7 Trumpers Way
Hanwell W7 2QA
Telephone: (01) 843 9903



Post to: VIGLEN COMPUTER SUPPLIES UNIT 7, TRUMPERS WAY, HANWELL, W7 2QA

Please send me (state number required)

I enclose Cheque/P.O. for £

I prefer to pay ACCESS/BARCLAYCARD (Delete whichever not applicable)

Card No. _____

Signature _____

Name _____

Address _____

Please make cheques payable to Viglen Computer Supplies

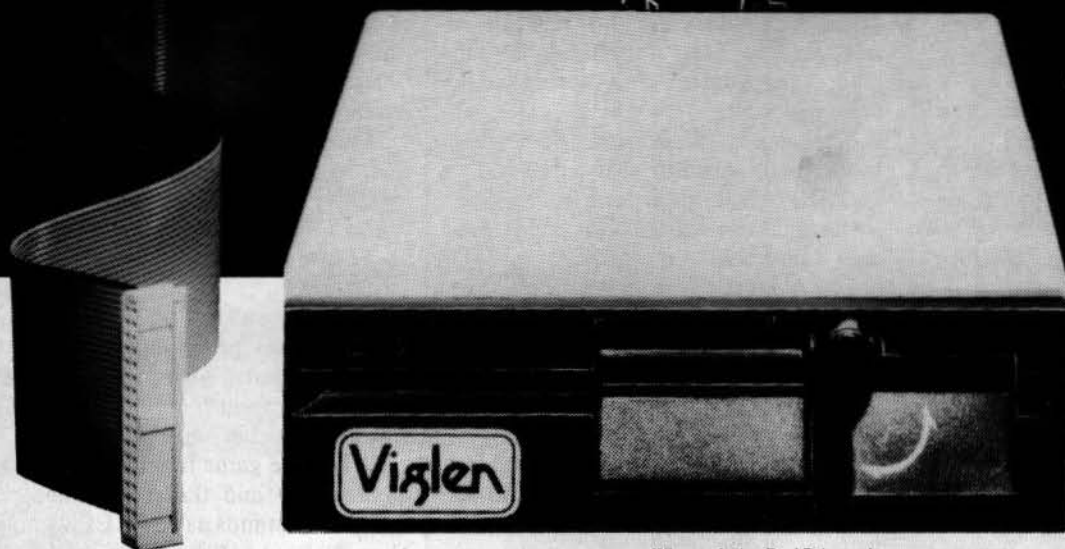


Put an end to inefficient, slow cassette tape storage



Speed your data access with a TEAC disk drive from Viglen

Please enquire about our latest 3 inch disk drive!



Replacing your cassette with a disk drive means Data Access in less than 5 seconds! If you are looking for a guaranteed disk drive that's fully compatible, at a price that includes VAT, Formatting Disk, User Manual, Case and Leads, then just look at our all-inclusive prices!

When ordering Dual Drives, please state which layout you prefer, A or B.



TEAC 55 Slimline Drives

SINGLE DRIVES	Incl. VAT	Excl. VAT	DUAL DRIVES CASED	Incl. VAT	Excl. VAT
40 TRACK 100K	£159	£138.26	40 TRACK 200K	£320	£278.26
40 TRACK 200K	£230	£200.00	40/80 TRACK SWITCHABLE 400K	£402	£349.57
40/80 TRACK SWITCHABLE 200K	£199	£173.05	40/80 TRACK SWITCHABLE 800K	£498	£433.04
40/80 TRACK SWITCHABLE 400K	£249	£216.52	DFS KIT	£95	£82.60
			Disc Filing System 100% Acorn Compatible		
			Power Supply Unit	£36.80	£32.00

- These drives are fully compatible with other computers and can be still used should you change your computer for another type.
- Orders welcomed from Educational Establishments and Government Departments.

Canon Drives

	Incl. VAT	Excl. VAT
40/80 TRACK SWITCHABLE 400K	£220	£191.30
800K DUAL	£440	£382.60
800K AND POWER SUPPLY	£476.80	£414.60

How to order

By post: To purchase any of the items simply fill in the coupon with your requirements. Enclose your Cheque/P.O. or use your Access/Barclaycard. Please make cheques payable to: VIGLEN COMPUTER SUPPLIES and post to above address. Allow seven days for delivery and add £8.00 carriage, package and insurance on all items.

By telephone: Ring (01) 843 9903. Credit Card holders (Access/Barclaycard only) can purchase by telephone. Please give Card No., Name, Address and the items required.

Viglen

COMPUTER SUPPLIES

Unit 7 Trumpers Way
Hanwell W7 2QA
Tel: (01) 843 9903

Please send me the following items:

I enclose Cheque/P.O. for £

I prefer to pay by ACCESS/BARCLAYCARD. Card No:

Signature

Name

Address

*Delete as necessary



Full Twelve Months Guarantee



From Page 99

that responds to a particular key and saves the screen display even though another program was running at the time, so that the display can be dumped to a printer later – probably with that superb screen dump we featured in the January issue”.

“Yes”, wept our weary Editor.

A few hours later his dream had come true in the form of the two programs listed on this page.

Program I is in assembler and contains three separate routines.

The set interrupt program (lines 40 to 140) changes the IRQ vector to include the key test routine in the interrupt.

The key test routine (lines 180 to 300) tests to see if the _ key has been pressed.

If it has not been pressed it returns to the normal interrupt handling procedure.

If it was pressed, the return from interrupt address on the stack is altered before returning to the normal interrupt handling procedures.

At the end of the interrupt control is transferred to the loader routine instead of the program being run when the interrupt occurred.

The loader routine (lines 320 to 540)

sets up a zero text window, clears the buffers, sets up KEY0, puts function key 0 into the keyboard buffer and executes a *BASIC command.

Data for KEY0 and *BASIC is on lines 570 and 590 and the CALL on the last line calls up the set interrupt routine.

Program II, which is “chained” in by the loader program, is in Basic and simply *SAVEs the whole of a Mode 2 screen onto disc. At this point it is advisable to press the Break key to reset the pointers and variables in memory.

The screen display can be loaded back into memory by *LOAD “SCREEN”. If this is done from within a screen dump program, it is possible to then dump this to a printer.

This package was written for a disc system and will not work on a tape-only system.

Care was taken in fitting the program into areas of memory that are not generally used by games programs – part of the cassette filing system used for the BPUT and BGET from &380 to &3AF, and the printer buffer from &880 to &8BD.

If the program being used accesses these areas as well a system crash is almost certain.

```
10 *SAVE*SCREEN*3000 8000
20 VDU 6
30 MODE 7
40 PRINT "SCREEN SAVED"
50 PRINT "DO NOT SAVE ANOTHER SCREEN
   ON THIS DISC UNLESS YOU RENAME
   THIS SCREEN DUMP OR IT WILL
   BE OVERWRITTEN"
60 PRINT "THE SCREEN DUMP IS CALLED
   'SCREEN'. TO RELOAD THE
   SCREEN TYPE :-          *LOAD
   SCREEN"
```

Program II

The area of memory used from &900 for the set interrupt routine is only used for initialisation and can be safely overwritten.

The key chosen to initiate the screen save is not normally used in games and it will be all right in most cases. If a different key is required then the CMP instruction on line 190 of the key test routine can be changed.

The number &A8 (168 in decimal) for key “_” is 127+41, where 41 is the negative inkey value shown as -41 on page 275 of the User Guide.

To use this utility, simply save both programs on a disc. Make sure the Basic program is called “SCDUMP”. Load the assembler program and run it.

The computer is then ready to receive the game program or whatever it is. This can be on either tape or disc.

When the game is running, press the chosen key and the screen should be saved as it stands as “SCREEN” on the disc. *RENAME it as necessary.

The utility may not work if the other program changes the interrupt or uses the same areas of memory.

```
10 FOR I=0 TO 3
   STEP 3
20 PZ=&900
30 [OPTI
40 .SETINT SEI
50 LDA &204
60 STA SD-2
70 LDA &205
80 STA SD-1
90 LDA #TEST MOD 256
100 STA &204
110 LDA #TEST DIV 256
120 STA &205
130 CLI
140 RTS
150 ]
160 PZ=&880
```

```
170 [OPTI
180 .TEST LDA &EC
190 CMP #&A8
200 BNE RET
210 TXA
220 PHA
230 TSX
240 LDA #SD MOD 256
250 STA &103,X
260 LDA #SD DIV 256
270 STA &104,X
280 PLA
290 TAX
300 .RET JMP &0000
310 .SD
320 LDA#28
330 LDX#5
```

```
340 .R JSR &FFEE
350 LDA#0
360 DEX
370 BNE R
380 LDA#15
390 JSR &FFF4
400 LDA#18
410 JSR &FFF4
420 LDX#KNEMX MOD 256
430 LDY#KNEMX DIV 256
440 JSR &FFF7
450 LDA#138
460 LDX#0
470 LDY#128
480 JMP B
490 ]
500 PZ=&3A6
```

```
510 [OPTI
520 .B JSR &FFF4
   :LDX#BASX MOD 256
530 LDY#BASX DIV 256
540 JSR &FFF7
550 ]
560 KNEMX=&380
570 #KNEMX="KEY0:MPA.=&
   1900:#D:IMCH."+
   CHR# (34)+"SCDUMP"+
   CHR# (34)+"IM"
580 BASX=&3A3
590 #BASX="B."
600 NEXT
610 CALL &900
```

Program I

A SLIMLINE TONIC FOR THE BBC MICRO

Cumana 5 1/4 inch slimline dual disk drives for the BBC Micro are now available from well known high street outlets, including W. H. Smith, John Lewis and Spectrum UK, as well as from Cumana's national dealer network.

The dual drives are available in two versions, as shown, including a 'switchable'. This version enables either drive to be switched independently between 40 and 80 track modes.

Each unit has an independent power supply, 12 months warranty, and is fully assembled and tested before packaging. A drive connecting cable, user manual, formatting diskette, power supply lead and plug are all supplied complete with the disk drives.

Look out for the distinctive Cumana packaging in your high street, today!



The best name in memory

Cumana Limited, Pines Trading Estate,
Broad Street, Guildford, Surrey, GU3 3BH.
Telephone: Guildford (0483) 503121 Telex: 859380

For further information
about Cumana
dual disk drives
for the BBC Micro,
please complete and
return this coupon.

Name

Address

Interests:

Home Use ☐

Education ☐

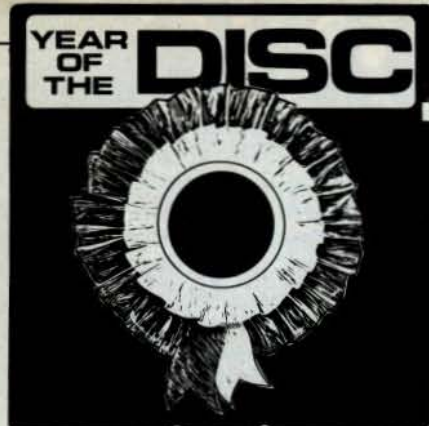
Dealer ☐

Business ☐

Tel. No.

Note: If dealer, please attach this form to your letterheading.

BMU3/84



Dig that mixed up square disc - find out what makes it tick

THE words disc and disc drive are often used when talking about computers, but I wonder how many people really know what makes a disc drive work?

By understanding the physical nature of discs and disc drives you will be more able to cope with the situation when things start to go wrong.

A disc storage system is a fast and convenient way to store programs and data.

The large mainframe computers (and some expensive small computers) use hard discs.

These are made of rigid aluminium and require a very precise drive mechanism as well as very clean air to operate in.

Most micros use flexible or floppy discs. These have a much smaller capacity for storing data and are much slower.

Generally they are more than adequate for the single user, as they are cheaper and require less finicky conditions than the hard discs.

The first point to strike a newcomer when looking at discs is the unmistakable fact that they are SQUARE! A moment's inspection will reveal that, inside the square envelope, there is a round disc made of a thin plastic (milar).

Coated on the plastic is a dark brown (sometimes black) layer of magnetic material. This is usually some form of metal oxide, ferric being the most common.

The coating is just like the one you get on tapes, so you can see a disc is a cross between a long playing record and a tape.

Do you remember the old riddle: "How many grooves are there on a long playing record?"

The answer, of course, is two - one on the front and one on the back.

For a floppy disc however, there are no physical grooves. Data is stored as a series of tracks (see Figure 1).

The tracks are concentric rings of data. All tracks hold the same amount of data despite those on the outside being longer than those on the inside.

Some computers do have different amounts of data on different tracks but

most are like the BBC Micro and have the same.

This simplifies the disc filing system and, as outer tracks tend to be more frequently used, it also slightly increases reliability.

Normally only one side of a floppy disc is used, but you can get drives that will use both sides.

The disc drive is the "record player", a device to read and write data. The components of one are shown in Figure II.

Basically it consists of a drive motor to rotate the disc inside its envelope. It does this by gripping the centre of the disc.

Some discs have a thin plastic re-inforcing hub at the centre to improve the grip and give a longer disc life.

Once the disc is spinning the read/write head is moved across the surface to position itself over the correct track.

The head is usually moved by means

of a stepping motor. This is a motor that moves through a small angle, usually 7.5 degrees, every time it receives a pulse.

The rotational movement of the motor is converted into lateral head movement by a helical worm gear.

Thus the head can be moved with precision over the surface of the disc.

However, when the drive is switched on the head can be in any position, so there must be some way of finding

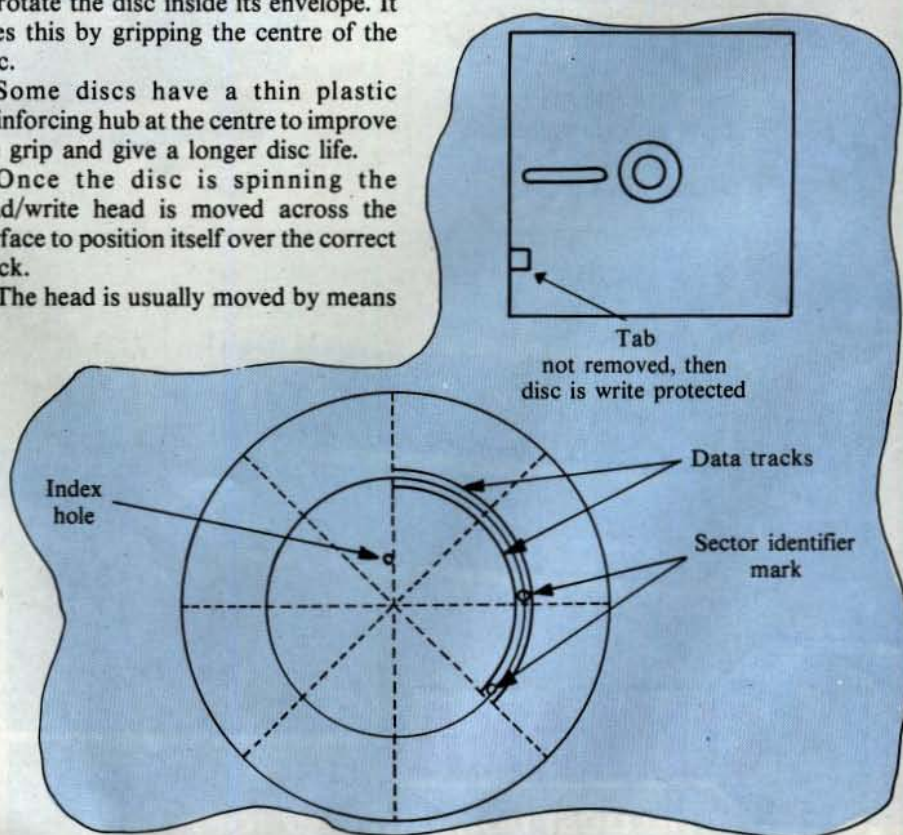


Figure 1: The structure of a formatted disc

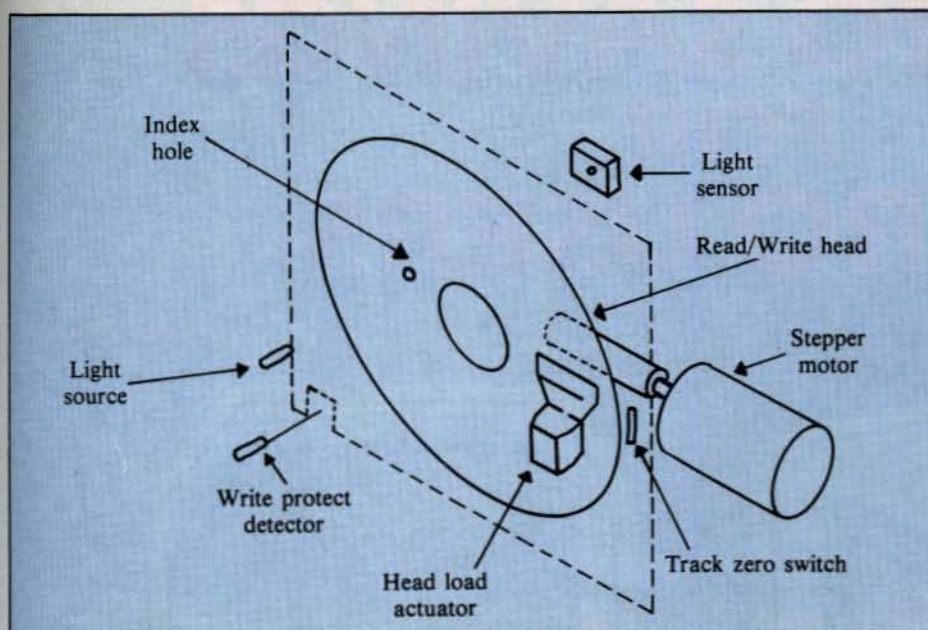


Figure II: Major mechanical components of a disc drive. The drive motor has been omitted for clarity.

precisely where it is.

This is usually done by a small micro switch which is tripped by the head when it is over track zero. The computer will keep issuing pulses to step the head backwards until this switch is tripped. This is known as restoring the head.

In order for the computer to find a precise position on any track, it must be given a signal at a fixed point on every disc rotation. This is provided by the small index hole near the rim of the disc.

Once every revolution this hole allows light through from an LED to a photoelectric sensor. This sends a pulse to the computer to indicate the start of the track.

Another photo sensor detects a notch on the outside of the disc's envelope. This is the write protect notch, and it can be covered up if you do not want to write onto the disc.

This will prevent accidents, as the software always looks at the signal from these sensors before performing any write operation.

There is also a head load actuator, a small lever controlled by an electromagnet. On the end of the lever is a small felt pad which pushes the disc against the read/write head.

This reduces disc wear by ensuring the disc is in contact with the head only when it needs to be.

On some disc units this actuator is very noisy and it may be heard clunking away while the disc is being accessed. This is not however a sign of a bad drive, merely a characteristic of the design.

In addition to the mechanical parts, a disc drive contains the electronics required to turn the motors on and off as well as reading and writing to the disc.

These electronics communicate with

By MIKE COOK

the computer over the disc bus. A bus is just a series of signal wires used to connect several devices together.

Most disc drives stick to a standard bus layout on the edge connector at the back of the drive. This means that manufacturers can have their own design of disc drive electronics and still be compatible with other people's products.

The standard disc bus is shown in

STANDARD DISC DRIVE BUS

Pin	Use
2	Not connected
4	Not connected
6	Not connected
8	Index pulse (start of a track)
10	Drive select 1
12	Drive select 2
14	Drive select 3 (not used on BBC)
16	Motor on (spin disc)
18	R/W Head direction select
20	Step (a pulse causes head movement)
22	Data to be written
24	Write gate (enables data to be written)
26	Track zero switch
28	Write protect notch is covered
30	Mixed data and clock read from the disc
32	Surface select (for double sided drives)
34	Not connected

Note all the odd numbers are on the other side of the edge connector and carry the signal ground (or earth).

Table I

Table I. As more than one disc drive can be connected to a bus each drive must be assigned a number. This is done by making a link on the electronics board.

Each drive on the bus must have a unique number to prevent more than one drive being active at any one time.

The signals on the bus marked SELECT will therefore activate only one drive. The other signals convey information we have already covered.

At the computer end of the disc bus there is the disc controller chip.

This is a very complex device. It accepts command numbers from the computer's microprocessor and generates the sequence of pulses on the disc bus to enable the disc drive to carry out the required action.

This is because the microprocessor is not fast enough to perform these actions by itself.

For example, the microprocessor can simply issue a command to move the read/write head to track 10. The disc controller chip then looks to see where the head is, and works out how many steps, and in what direction they will be needed to get to track 10.

It then issues that number of head step pulses.

Finally, when the head is in position it reads the track identification number to confirm it is at the correct track. Having completed the task it then reports back to the microprocessor that the move has been made successfully.

If the move was not a success this fact is reported and it is up to the disc filing system software to take appropriate action.

Usually the head is restored (moved to track zero) and another attempt is made. Several such attempts may be made before the disc filing system signals an error.

Just then I mentioned the track identification number. This is information that is put onto the disc during the formatting procedure which every disc has to go through before it can be used. This writes on the disc track and sector information.

We have already seen that a track is a ring of data stored on the disc, but this is too large a chunk of storage to be convenient. This is because disc storage would have to be allocated in tracks, thus wasting a lot of space.

To remedy this, each track is broken down into a number of sectors. A sector is the smallest unit of storage the disc

MACRO SAVINGS FOR MICRO USERS

DELIVERED TO YOUR DOOR *

£239.50
NO EXTRAS



14" STANDARD RESOLUTION COLOUR MONITORS

- MATCHING BBC COLOURS
- RELIABLE 12 MONTH WARRANTY
- 40-64 CHARACTERS • DOT PITCH 0.63mm
- FULLY COMPATIBLE WITH MOST COMPUTERS
- LOW POWER CONSUMPTION • BRITISH MANUFACTURE

INCLUDING VAT, DELIVERY* & PACKING **£239.50**

**UNIVERSAL COMMUNICATIONS
COMPANY**

ROYD NOOK, ROYDSTONE ROAD,
BRADFORD, WEST YORKSHIRE
0274-390114



DELIVERED TO YOUR DOOR* **£125.95**

NO
EXTRAS



5 1/4" DISC DRIVE SHUGART SA450 DSDD BBC COMPATIBLE FLOPPY DISC SYSTEM

COMPLETE WITH:

- PROFESSIONAL ALUMINIUM CASE
- RIBBON CABLE TO CONNECT TO BBC MICRO
- POWER CABLE TO CONNECT TO BBC MICRO
- 40 TRACK DOUBLE SIDED DOUBLE DENSITY 400K
- MANUAL AND FORMATTING DISC

INCLUDING VAT, DELIVERY* & PACKING **£125.95**

Also available:

BBC COMPATIBLE LOW POWER DUAL DISC SYSTEM

ALL FEATURES AS ABOVE

INCLUDING VAT, DELIVERY* & PACKING **£225.95**

5 1/4" CONTROL DATA FLOPPY DISCS

SS DD 48 TPI Pack of 10	£17.75
SD DS 96 TPI Pack of 10	£20.50
SS DD 96 TPI Pack of 10	£22.00
DS DD 48 TPI Pack of 10	£20.50
DS DD 96 TPI Pack of 10	£23.00

FULL RANGE IN STOCK

FILL IN THE ORDER FORM AND SEND IT WITH REMITTANCE TO:-

Universal Communications Company

FREEPOST Roydnook, Roydstone Road, Bradford, W. Yorkshire BD3 7BR.

DESCRIPTION	QTY	PRICE	TOTAL
14" STANDARD RESOLUTION COLOUR MONITOR		239.50	
5 1/4" DISC DRIVE SYSTEM		125.95	
5 1/4" DUAL DISC SYSTEM		225.95	
5 1/4" CONTROL DATA FLOPPY DISCS			
SS DD 48 TPI Box 10		17.75	
SD DS 96 TPI Box 10		20.50	
SS DD 96 TPI Box 10		22.00	
DS DD 48 TPI Box 10		20.50	
DS DD 96 TPI Box 10		23.00	
TOTAL PAYABLE			

NAME

TITLE

COMPANY

ADDRESS

POST CODE:

I enclose a cheque/P.O. for a total of £
made payable to U.C.C.

PLEASE ALLOW AT LEAST 10 DAYS FOR DELIVERY

* DELIVERY TO ANY ADDRESS IN U.K.



From Page 105

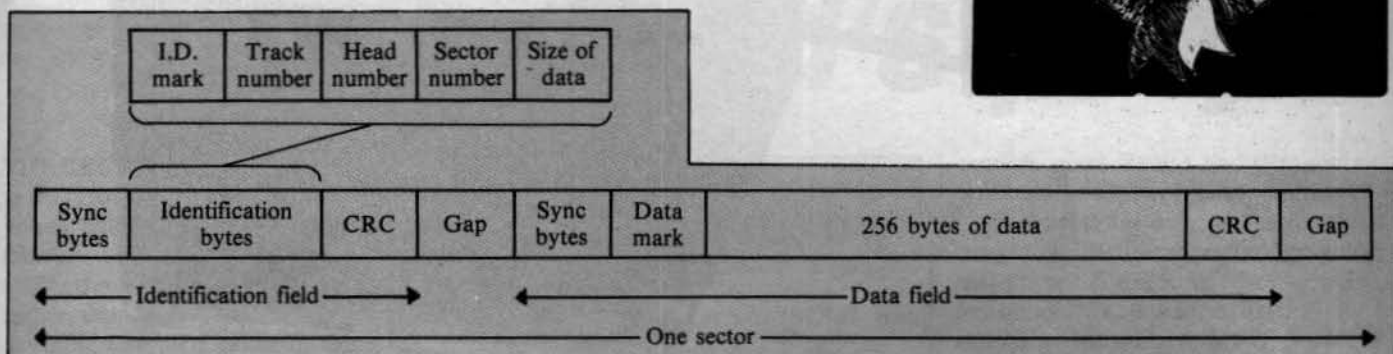


Figure III: The composition of a sector

holds, and all data transfer to and from the disc is done with sectors of data.

In the BBC Micro each track contains 10 sectors and each sector can hold 256 bytes (characters) of data.

Each sector has a few bytes of sector identification information before the actual data. This is shown in Figure III.

The CRC information is a Cyclic Redundancy Check, a simple method of testing the data for errors.

When data is written onto a track the disc controller chip calculates a 16 bit number from this data. This occupies the two CRC bytes and is written after the data.

When reading back the data the CRC is also calculated and compared with the CRC originally written with the data. If these are the same it is assumed there is no error.

However, if they are different then there has definitely been an error. The method used by the disc controller chip to calculate the CRC value is shown on page 399 of the User Guide.

In order for the start of a sector to be uniquely identified, a special code is written on the track – it is known as a mark. You will see in Figure III that

there is an identification mark and a data mark.

In order for us to understand exactly what a mark is, we must first see how normal data is stored on the disc.

It is stored in serial form just like the cassette tape system. But instead of the logic zeros and ones being represented by audio tones they are represented by a system of pulses.

Each pulse is represented by a magnetic field placed on the disc by the read/write head. Figure IV shows the form that one byte takes. Note that, unlike the tape system, there are no start and stop bits.

This is known as synchronous data, as opposed to the tape's asynchronous system and it allows more data to be packed into a limited space.

However, before we can make any sense of data in this form the disc controller chip needs to synchronise to it.

This is easily achieved by using clock pulses in every byte of data. The pulses are also needed due to the nature of magnetism – if they were not included the data could not always be correctly recovered.

Each bit starts with a clock pulse and if the bit is a logic one there is a data pulse in the middle of the bit time. There is a limit as to how fast these pulses can be put onto the disc so the capacity of the disc is fixed.

The electronics surrounding the disc controller chip separate the clock pulses and the data pulses from the mixed stream which is read back off the disc.

A mark byte is a byte where some clock pulses are missing.

If you consider the clock component in a normal byte to be &FF (that is all ones, a clock pulse every time) then a mark will have a different number associated with the clock component.

There are a number of standard mark signals and these are shown in Table II. Remember that for normal data the clock component is always &FF. It just differs for the marks.

The disc controller automatically copes with the marks when finding a specific sector.

There are two types of data marks. The first indicates there is data in the sector and the second indicates the data

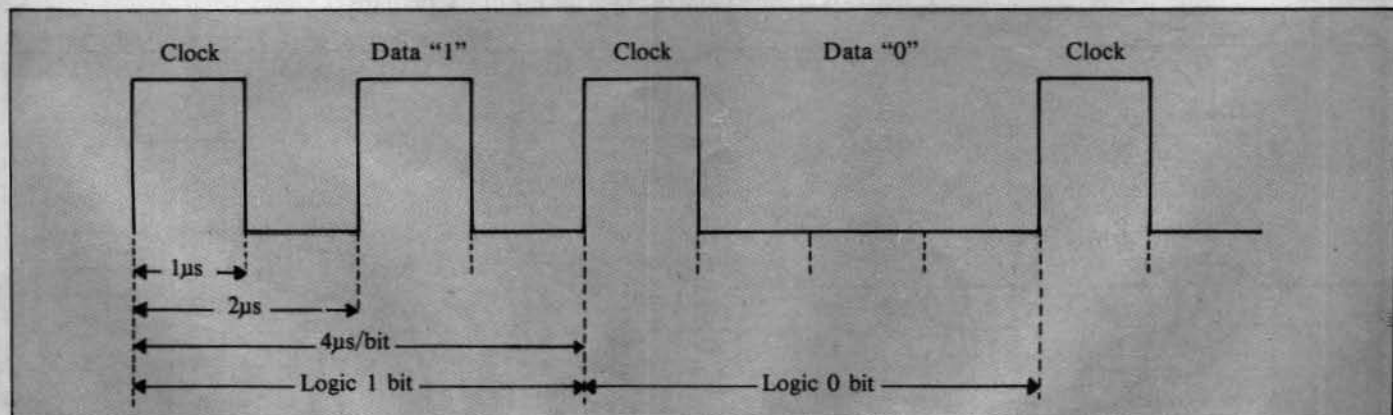


Figure IV: Data encoding



From Page 107

in the sector has been deleted.

This means to delete data you just have to change the data mark and not the data. The disc controller chip has special commands for reading data and deleted data. So sometimes, if you have the right software tools, it is possible to recover a deleted file.

The index mark is used at the start of each track and is placed just after the index hole has passed the detector.

Before each block of information there are the "sync bytes" that synchronise the decoder inside the disc controller chip. These six bytes are always data bytes with a hex value of 00.

This method of coding the bits in terms of pulses is not particularly efficient. Its main advantage, however, is that it is easy to separate data pulses and clock pulses, and also marks are easy to generate.

There is another way of encoding bits

STANDARD MARKS

Clock pattern	Data pattern	Type of mark
(Hex)	(Hex)	
D7	FC	Index mark indicates sector start
C7	FE	Sector ID mark
C7	FB	Data mark
C7	F8	Deleted data mark

Table II

using fewer pulses and, as there are fewer, more bits can be put on any one track.

It is known as double density encoding and must not be confused with double track density, which is merely the result of the tracks being closer together.

The disc controller chip in the BBC Micro will not cope with double density encoding. However plug-in boards are available which allow the BBC Micro to cope with it. The method of double density encoding is shown in Figure IV.

It might seem a little difficult at first to see what is going on. Normally the clock pulse is missing and only the data pulse is present.

However, when the bit is a logic zero AND the previous bit was also a logic zero there is a clock pulse at the start of the bit time.

This keeps up the minimum number of pulses needed to keep the magnetic material happy.

You can see that in any one bit there are half the number of pulses, and so we have double the density.

Separation of the data from the clock pulses is complex and requires the use of

a circuit known as a phase locked loop. This circuit would require a whole article just to explain, so we are better off skipping that!

If you remember that discs store data in the form of magnetic pulses you can probably predict how to handle them.

Basically, don't touch the magnetic surface of the disc, as the grease from your finger will damage the head.

Don't put the disc near any magnetic fields as this will remove the magnetic pulses. Someone I know had a loud-speaker perched on top of his disc drive with the effect that most of the data was rubbed out when the drive made its first rotation.

Discs should not be subjected to extremes of temperature, and although they are floppy it does not mean they should be flopped.

Particles of smoke, not to mention cigarette ash, are also quite lethal to a disc.

Given reasonable care a disc should last at least five years of normal use, and some manufacturers guarantee their products for a lifetime. (The lifetime of what they do not say - the disc, perhaps?)

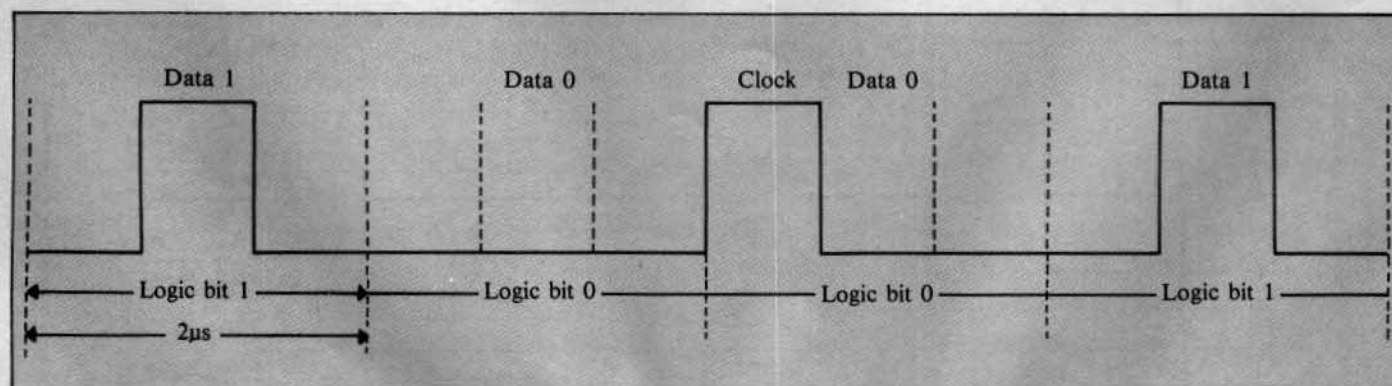


Figure V: Double-density data format

Disc loading made child's play

THE BBC disc system is extremely easy to use. However some people, especially young children, find even this system tricky.

For those who wish to use a program, rather than change it, write it or do anything else, it is easier to use a disc system if a menu of programs on the disc appears and the user types a number to select a choice. It is with that in mind that I wrote this program.

The program can be used in two ways. People with an Acorn DFS should use PROCreadmem, which reads the copy of the catalogue from the memory. The same program can then be used on any disc.

As different disc systems store the catalogue in memory in different ways, PROCread allows the user to put the file names into DATA statements.

The DATA statements are then changed if the program is used for different discs.

If you are not sure which make of DFS you have, the make is indicated on the screen when you switch your computer on.

Here are the instructions to set up an automatic loading system:

- Type in the program as shown. You may type in just the part you require as indicated by the REM statements. Note that lines 1000 onwards should contain the names of the programs on your disc, rather than PROG1, etc.
- Save under the program with the name "MENU".
- Type *BUILD !BOOT and press Return.
- After the number 1 that appears, type CHAIN"MENU" and press Return.

By
PETE DAVIDSON

● Press Escape. The file !BOOT will then be saved to disc.

● Type *OPT4,3 and press Return. (This is required so that booting the computer will automatically run the program !BOOT.)

Once you have set up the system, to use it you boot the computer by pressing Shift and Break together, then releasing Break but continuing to hold down Shift until the disc starts.

A menu will appear on the screen. Select the number of the program you

require, press Return and the program will load and run.

This program only works for Basic programs. The message "Bad program" will appear if anything else is selected.

How does it work?

With the Acorn DFS, memory locations &E00 to &E07 contain a copy of the first part of the title of a titled disc. From &E08 onwards is a copy of the names of the files on the disc in blocks of 8 (the 8th byte is not part of the name).

PROCreadmem reads these blocks of memory, while PROCread obtains the same data from DATA statements.

Note that if you have an Acorn DFS, you do not need lines 190 onwards and



From Page 109

lines 40 and 110 should read PROCreadmem.

With any other DFS, omit lines 190 to 240 and put the program names in DATA statements from line 1000. Lines 40 and 110 should be PROCread in this case.

The file names are stored in a string array and the appropriate element in the array loaded, moved lower down in memory to give longer programs room to run (downloaded), and run.

```
5      Sets up KEY0 to load,
      download and run the
      program.
10     Moves the display down one
      line (optional).
20     Selects MODE.
30     Initialise variables. J% is a
      program number. L% is
      start location for each
      program (with Acorn DFS).
      WS(J%) are the program
      names.
40     Calls whichever procedure
      you have chosen.
50-60  Title lines. If you have an
      Acorn DFS (and are using
      PROCreadmem), put a title
      on the disc using *TITLE
```

(see DFS manual). If you have any other DFS (and are using PROCread), put the title in place of the @ in line 280. The first seven characters of the title will be printed by this program.

```
70-120 Reads the next file name
      and stores it in the next
      element of the array. It uses
      either PROCreadmem or
      PROCread as described
      below. A check is made that
      there are not too many
      programs to fit in one
      column on the screen (line
      100).
130     Sets N% to the number of
      programs.
140     Prints the program on the
      screen.
150-160 Takes in request and
      validates it.
170     Prints a message.
180     Calls KEY0 (see line 5).
190-240 PROCreadmem reads the
      next 7 bytes starting at L%
      and stores them in a string
      WS(J%). These lines are
      only required if you have an
      Acorn DFS. In that case
      lines 40 and 110 should read
```

PROCreadmem.

250-270 PROCread reads the next item of data, converts it to a length of 7 and stores it in WS(J%). These lines (and the DATA statements) are only required if you have a DFS other than Acorn. In that case lines 40 and 110 should read PROCread.

280-5000 The DATA required by PROCread.

This program is written for clarity rather than efficiency.

It is hoped that, while working well for beginners, more experienced users will use the ideas to write more efficient programs themselves.

Colour control codes were entered using shifted function buttons. In the listing these show in PRINT statements as numbers in brackets, underlined. 129 corresponds to shifted f1, 130 to shifted f2 and so on.

The menu is set for 20 programs (which looks neater as a single column display). Change 140 to:

```
140FOR IZ=1TONX:PRINT IZ"...
    *WS(IZ);:NEXT
```

and omit 100 to allow more names to appear.

Disc Loading listing

```
1 REM DISC LOADING PROGRAM
2 REM INCLUDING AUTOMATIC DOWNLOADER
3 REM (c) Micro User 1984
5 *KEY0=DISCLOADW$(WZ):NIFERR<>OT
  HEN*FX15,11M*TAPE:MDX=PAGE-&E00
  :FOR IZ=PAGE TOTOP STEP4
  :!(IX-DX)=!IX
  :NEXT
  :?(TOP-DX)=255
  :PAGE=&E00:MOLD:MMODE7
  :RUN:M
10 *TV255
20 MODE 7
30 JZ=0
  :LX=&E00
  :DIM W$(40)
40 PROCread
  :REM Change this to PROCreadmem
  if you wish the menu to be
  automatically read if you have
  an Acorn DFS.
50 CLS
  :PRINT "<136><130>PETE'S SUPER
  LOADING SYSTEM<137>";
60 IF (ASC (W$(JZ))AND 191)=0
  THEN PRINT
  :PRINT
  ELSE PRINT "...W$(JZ)
  :PRINT
```

```
70 REPEAT
80 LX=LX+8
90 JZ=JZ+1
100 IF JZ>21
  THEN PRINT "<129>TOO MANY FILES
  FOR THIS SYSTEM""<130>CHANGE
  LINES 100 AND 140 AS DESCRIBED"
  "<130>IN THE ARTICLE"
  :END
110 PROCread
  :REM Change this to PROCreadmem
  if you wish the menu to be
  automatically read if you have
  an Acorn DFS.
120 UNTIL (ASC (W$(JZ))AND 191)=0
130 NZ=JZ-1
140 FOR IZ=1TO NZ
  :PRINT "<129>IZ"...W$(IZ)
  :NEXT
150 PRINT
  :PRINT "<134>TYPE REQUIRED NUMBER
  ( THEN<136>RETURN<137>);";
160 INPUT "WZ
  :IF WZ<10R WZ>NZ
  THEN 160
170 CLS
  :PRINT
  :PRINT
  :PRINT " <133> LOADING "W$(WZ)
```

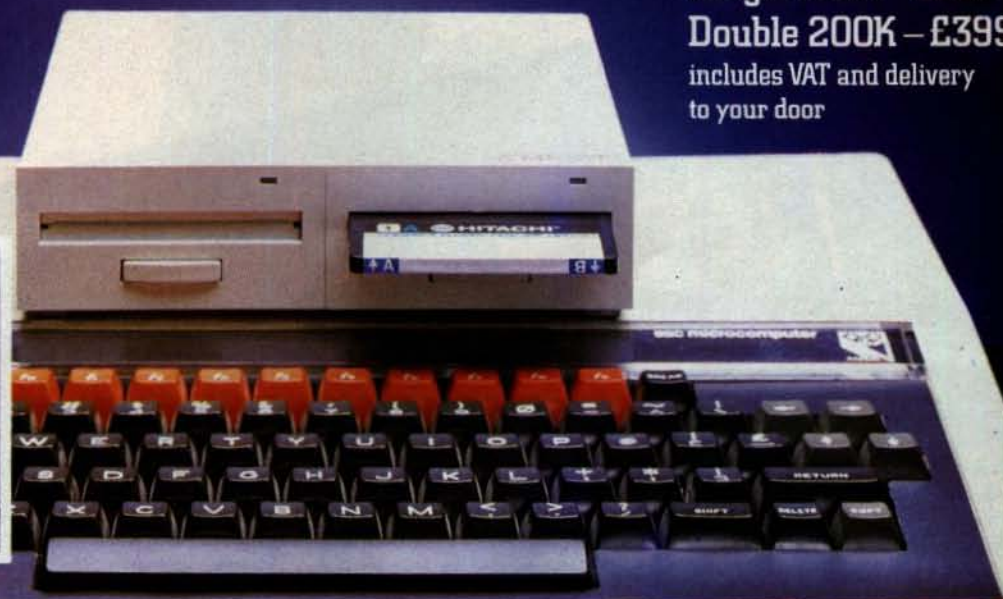
```
180 *FX138,0,128
185 END
190 DEF PROCreadmem
200 FOR IZ=0TO 6
210 L$=CHR$(?(LX+IZ))
220 W$(JZ)=W$(JZ)+L$
230 NEXT
240 ENDPROC
250 DEF PROCread
260 READ W$(JZ)
  :W$(JZ)=LEFT$(W$(JZ)+
  ",7)
270 ENDPROC
280 DATA @
290 REM you may put a title (7 charac
  ters maximum) in place of @
  in the above line if you require.
990 REM Put the names of your program
  s in the following DATA lines.
1000 DATA PROB1
1010 DATA PROB2
1020 DATA PROB3
1030 DATA PROB4
1040 DATA PROB5
5000 DATA @
  :REM this line must be left
  as an end of file marker. Put
  your own program names in DATA
  statements from line 1000 to
  4999.
```


- The complete AMS disc drive package, tailored to your BBC micro, is compatible with all disc interfaces and includes cables, a comprehensive manual and utilities on disc and EPROM. Housed in a steel case, matching the BBC micro, these reliable and robust Hitachi 3" disc drives are the ultimate for home, office and classroom.
- The 3" disc is totally enclosed in rigid plastic and a unique automatic steel shutter protects the delicate disc surface from dust and finger marks. For the first time discs can be used in industrial, educational and commercial environments without the worry of corrupting precious programs and data.
- The disc is "flippable" like a cassette tape and has a storage capacity of 100K on each side in single density mode (twice as much when used with a double density interface). A neat plastic switch can be flicked back and forth to write-protect valuable discs.
- The AMS disc drives are completely hardware and software compatible with 5¼" drives which can be used in parallel so allowing easy transfer of software. Consequently the 3" drives will operate with all the standard floppy disc interfaces. They take their power from the outlet provided by the BBC micro - there's no onboard power supply to corrupt data.
- The AMS package includes utilities on both a disc and an EPROM for formatting and verifying discs. The EPROM, which is easily fitted, offers a simple to use and permanent alternative to using the utilities disc.
- The impressively engineered Hitachi 3" drives feature an eject button allowing single handed operation, a multi-colour LED indicating the disc side in use, and a brushless direct-drive motor for reliable operation. The super fast track-to-track access time of 3ms is at the forefront of disc drive technology. The longest of programs are loaded in a flash.

Advance with AMS

3" Disc Drives - The Ultimate Choice

Single 100K - £225
Double 200K - £399
includes VAT and delivery
to your door



Reliable delivery

If not available from your local dealer fill in the coupon below and we will send it to you with our full no-quibble money back guarantee.
Advanced Memory Systems Ltd, Green Lane, Appletton, Warrington, WA4 5NG.
RING 0925 62907
24 HOURS 62662

TO: Advanced Memory Systems, Ltd, Woodside Technology Centre, Green Lane, Appletton, Warrington, Cheshire WA4 5NG.

Please send me by door-to-door courier:

Qty ☐ AMS-3 (S) single disc drive all inclusive package at £225 each

Qty ☐ AMS-3 (T) twin disc drives all inclusive package at £399 each with two free discs.

Prices include EPROM, utility disc, cables, manual, VAT and delivery.

Please send me by post, if not with drives:

Qty ☐ double sided (100K x 2) discs at £4.95 each.

Qty ☐ packs of five at £22.50 per pack.

I enclose a cheque for £ or debit my credit card.

No ☐

Name

Address

Post Code Tel No

Signature Date

Please allow up to 28 days for delivery.



Hitachi - in a word reliability

THE DRIVE FOR QUALITY



In the rapidly expanding world of computer peripherals there is one company which continually leads the field — Cumana. Whether it is the best Japanese components used in our top quality designs, the rigorous training which all staff receive, or the superb technical service we offer, everything must be of the highest standard.

Cumana disk drives have an independent power supply, 12 months warranty, and are fully assembled and tested before packaging; and they are now available for the BBC and Dragon Micros — at unbeatable value for money prices — from selected branches of W. H. Smith and Spectrum UK in addition to Cumana's nationwide dealer network.

For further information on these and other Cumana products — including dual slimline disk drives for the BBC Microcomputer — contact:

Cumana Limited, Pines Trading Estate,
Broad Street, Guildford, Surrey, GU3 3BH.
Tel: (0483) 503121 Telex: 859380



Dragon is the registered trademark of Dragon Data Ltd.

For further information about Cumana disk drives, please complete and return this coupon.

I am interested in Cumana disk drives for the BBC/Dragon* Microcomputer. *delete as necessary

Interests:
Home Use ☐
Education ☐
Dealer ☐
Business ☐

BMU 3/84

Name

Address

Tel. No.

Note: If dealer, please attach this form to your letterheading

Saving grace

"THE difficulty experienced in loading a program from tape is inversely proportional to the number of copies of the program you have made".

Even with a sound understanding of the stated law, there are occasions when it is only possible to save your latest masterpiece once. It may be a long program and you are short of either time or tape!

Whatever the reason, the fact that you have only one copy puts you at risk of losing the whole program.

If just one block refuses to load correctly, pressing Escape is likely to prompt a rather curt, and singularly unsympathetic, "Bad Program" in reply.

A student who had been typing for two hours on a previous day suffered this precise fate. He was, quite correctly, convinced that the part that had been loaded was in there somewhere.

The problem was that the machine would not let him at it.

Fortunately, his lost block being near the end, it was possible to retrieve the situation so that he could LIST the complete lines which had been loaded.

He had then to retype only the last few lines which had been lost.

To follow how this can be done it is necessary to understand how a Basic program is stored in memory. The best way to do this is to examine the appropriate area of memory using the operator.

First, set up a function key to show the contents of locations PAGE, where your Basic program is stored, up to PAGE+20.

For example:

```
*KEY9 FORI=PAGE TO PAGE+20
:PRINTI,?I :NEXTI
```

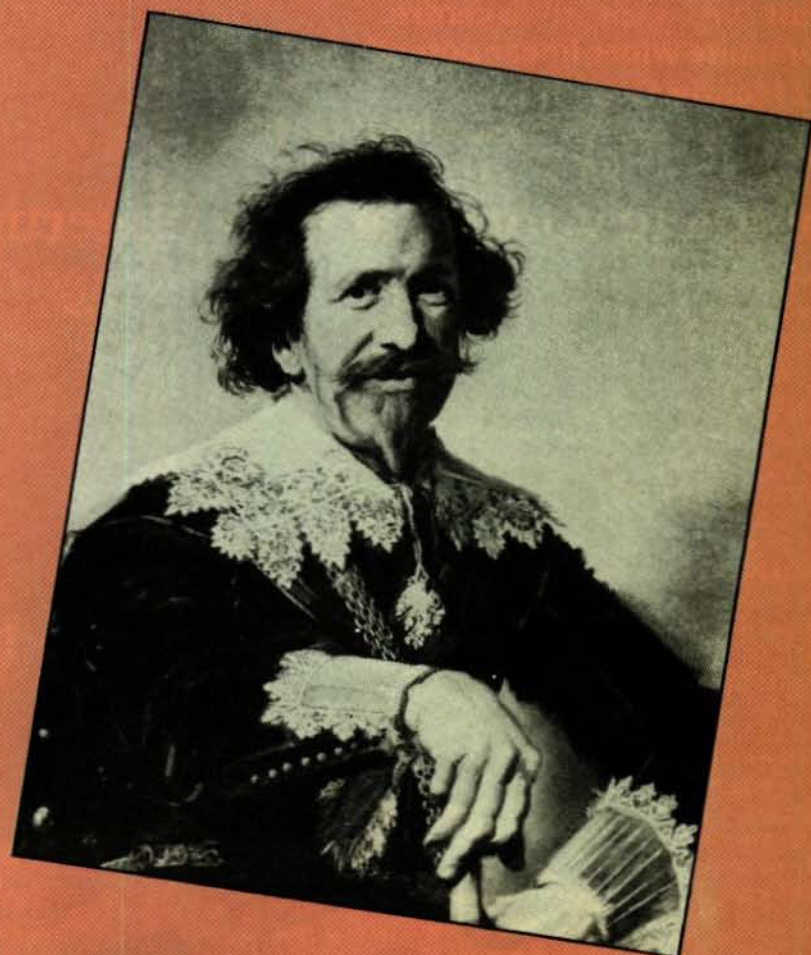
Then type NEW, press Return, and enter the simple program which we shall then examine:

```
10REM
20REMARK
```

Note that there are no spaces.

Pressing key f9 will now display Figure I.

On machines with the Acorn Disc Filing System installed the addresses will run from 6400 to 6420. These



FRANK DART shows how to rescue your latest masterpiece when the tape refuses to load correctly

ADDRESS	CONTENTS	COMMENTS
3584	13	START OF BASIC LINE
3585	0	LINE NUMBER,HIGH
3586	10	LINE NUMBER,LOW
3587	5	LENGTH OF LINE
3588	244	TOKEN FOR REM
3589	13	START OF BASIC LINE
3590	0	LINE NUMBER,HIGH
3591	20	LINE NUMBER,LOW
3592	8	LENGTH OF LINE
3593	244	TOKEN FOR REM
3594	65	ASCII A
3595	82	ASCII R
3596	75	ASCII K
3597	13	START OF BASIC LINE
3598	255	LINE NUMBER,HIGH
3599	?	LINE NUMBER,LOW
3600	0	does not matter
3601	0	does not matter
3602	141	does not matter
3603	72	does not matter
3604	160	does not matter

Figure I: Basic program storage

Increase your fire power!

More than just a joystick—a system

- ▲ Nylon encased—Steel shafted joystick with ball and socket joint.
- ▲ Fast sprung return to centre.
- ▲ Graphite wiper linear potentiometers.
- ▲ 12 Months Guarantee.
- ▲ 7 day Money back Guarantee (on Hardware).

Complete control at your fingertips

A superb joystick and a keypad for the price of either one. Plus the software to integrate it into the computer's system. One handset will work on it's own in the A/D port as a joystick and two fire buttons. Joystick is immediately compatible with ACORNSOFT and similar software.

The adaptor box joins together the analogue and the user ports to use the full keypads giving a total of 24 user definable keys. The adaptor box can also be used as a splitter for the A/D port to take two items at the same time, e.g. joystick and lightpen.

DELTA DRIVER on cassette or disc: Two programs on each cassette or disc. One converts machine code programs from the keyboard to the joystick or keypad, with adjustable sensitivity on the joystick and will run on any O.S. The second program (needs O.S. 1.0 or later and an adaptor box) duplicates any keyboard keys on the keypads, in the operating system, so that it can become a numeric keypad or will take on the function keys.



SAE for more detailed information.

Numerous stockists nationwide or direct from us.

DELTA 14b HANDSET £12.95
DELTA 14b/1 ADAPTOR BOX £13.95
DELTA DRIVER CASSETTE £5.95 or DISC £8.95
Prices include VAT and P&P.

Voltmace *delta 14b*

Callers welcome at the factory — Monday to Friday.



VOLTMACE LTD,
PARK DRIVE,
BALDOCK,
HERTS.
SG7 6EV.
Tel: (0462) 894410

From Page 113

figures will vary with other DFS.

Basic is stored in a compressed fashion using "tokens" for the keywords – that is, one byte is used as a code for the keyword. The tokens are listed on page 483 of the User Guide.

Of greater interest at the moment are the four extra bytes on each line. In line 10 these are 13, 0, 10 and 5. In line 20 they are 13, 0, 20 and 8.

Each line of the Basic program can be distinguished by the 13s which can be thought of as start of line markers.

The two numbers which follow each 13 are a coded version of the Basic line number.

The first (LINE NUMBER,HIGH) is "how many 256s in the line number". The second (LINE NUMBER,LOW) is "how many leftover". So line 10 is recorded as:

0 256s

10 left over

Line 300 would be:

1 256s

44 left over

and line 1000 would be:

3 256s

232 left over.

The third number after each 13 is of particular importance. This gives the length of the stored version of each line.

A consequence of the way that this value is worked out is that the "line length" byte gives the address of the next 13 when added to the address of the previous 13.

In our example the first line, 10REM, is stored from location 3584 and upwards. Since the line length of this line is 5, the next line is stored from location $3584+5=3589$ and upwards.

One advantage of this method is that the Basic interpreter can quickly scan through the program, looking for a particular line number without having to read all the text.

Let's refer to the line length bytes as "links", since they link one line to the next.

A correctly linked program is one in which you can keep adding the link to the address of the previous 13 to get the address at which the next line starts. This should contain 13.

If it does not, then something has gone wrong and it is a "Bad Program".

A lost block would, at some point, give a link to an address which had not been loaded with the required 13, hence "Bad Program".

To retrieve what has been loaded

correctly it is necessary to make the interpreter think it has reached the last line of the program before it reaches the bad link.

Fortunately this is relatively simple. Looking at the example once more you will see that the last line links correctly to a 13 ($3589+8=3597$) which should mark the start of the third line.

"But", I hear you say, "there is no third line".

Well, this is the way the end of the program is stored – the physical end that is, whether or not it be an END statement.

There is a 13 just as if it is another line, but the LINE NUMBER,HIGH is a rogue value. A 255 in this position would mean a line number of at least $255*256=65280$.

Since the highest you can use is 32767 this particular value signals the end of the program.

All we need to do to stop the "Bad Program" error is to put 255 into the first of the two line number bytes before the bad link is reached.

This will fool the interpreter into believing it has reached the end and it will therefore look no further. The bad link will not be seen.

The secret is to put the 255 in the correct position to maximise the number of lines retrieved.

The program below does just this:

```
10 PX=3584
20 REPEAT:PRINT256*(PX?1)+PX?2
30 LZ=PX?3:PX=PX+LZ
40 UNTIL?PX<>13:PRINT"FAILS HERE"
50 PX=PX-LZ:PX?1=255
60 PAGE=3584
```

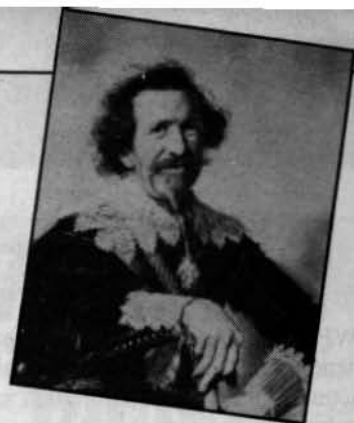
This may be typed in when needed, or can be loaded from tape. In either case it is vital that it is located in some free area of memory so that it does not overwrite the program that is being retrieved.

A convenient way of doing this would be to ensure you were in Mode 7. This gives the maximum room to play with. Since HIMEM is &7C00 and the retrieve program is less than one block long, it can be safely placed at &7B00.

The way it works is to use a pointer, P%, to point at each successive 13 starting at PAGE. The line number is calculated from the coded form and printed onto the screen.

The link, L%, is picked up from location $P\%+3$ and is used to calculate the address at which the next line should start.

So long as this address contains a 13, the process continues.



When a 13 is not found in the calculated position – in other words, the link is broken – L% is taken off the pointer to go back to the previous 13.

P% is now pointing at a line which does not link. The 255 is then put in at $P\%+1$ to terminate the stored version correctly.

Finally PAGE is set back to its original value so that typing LIST will display what has been recovered. This can now be edited or added to in the normal way.

Try it out using the following procedure:

1. Load a fairly long Basic program but press Escape before it has finished loading. You should get the "Bad Program" error message.

Having thus simulated the problem of the lost block:

2. Type:

MODE 7	Return
PAGE=&7B00	Return
NEW	Return

The use of &7B00 for PAGE is convenient, being safe for both cassette and disc machines.

NEW will not lose your previous program as PAGE has been reset so that the retrieve program will be stored well out of the way.

3. Type in, or load, the retrieve program.

4. If using an Acorn DFS change the number 3584 to 6400 in both lines 10 and 60. For other DFS change this number to the appropriate page number.

5. RUN the program. You should see the retrieved line numbers scrolling the screen.

6. Type LIST to display what has been recovered.

Should you need to use this utility in earnest then you should perform steps 2 to 6 only.

You may never need this program but, being so short, it is worth typing in and saving just in case you do.

Make a note of the instructions (2 to 6 above) and copy the listing on a piece of paper. Store this in the cassette box with the program on cassette. The copy of the listing is just in case the program won't load.

But isn't this where we came in? ☞

Paintbox

Oakleaf

"WHAT'S the point?" said a learned friend when I told him I was painting pictures on a micro. "You might as well stick to real brushes and canvas – you'll get a much better effect".

Well, yes I suppose so. But then again, you could have told Michelangelo to stop messing about with a chisel and a block of marble – or scoffed at the early photographers experimenting with their new-fangled cameras.

The point is that you can use just about any kind of medium to produce something artistic, so why not a computer?

There are quite a few methods to do this – a light pen is perhaps the one that most accurately captures the feel of drawing.

Paintbox, however, uses keyboard, graphics tablet and joysticks to create images – with very interesting results once you get used to painting by proxy.

You get a choice of Modes 0, 1 or 2 but I found the first two difficult to work with as the palette or bar of colours at the top of the screen was so tiny. And anyway you are limited to just a few colours.

So I began in Mode 2, and after several minutes cursing the cassette player, the micro and the program itself I discovered that in order to get an image it helps if you don't try painting in black on a black screen!

Perhaps the programmer could have worked it so that the cursor's colour defaults to white at the beginning.

There are lots of facilities. It's easy to create geometrical shapes and lines by pressing just one or two keys and moving the cursor around.

But even better, from an artist's point

The micro-age answer to Michelangelo?

of view, is the command that enables you to build up tones – combining several colours by using a dot pattern instead of solid or flat areas of colour.

I found that using joystick and keyboard together was the best way to control the cursor – joystick for general areas of colour, with a freer style and keyboard for finer detail.

Pressing keys 1 and 2 alters the speed in the keyboard mode, useful if you want to do carefully controlled intricate detail. But why, oh why, did this command have to be put next to the Escape key, which wipes out the image on the screen?

I'd spent more than an hour on my masterpiece and was putting on the finishing touches when I accidentally hit Escape and the whole thing disappeared.

Surely it wouldn't have been too difficult to arrange things so that you have to press Escape twice before the screen clears?

The instruction manual is fairly comprehensive and easy to understand.

The manual claims that the program lends itself to serious applications such as computer aided design but from my experience I think this might be asking too much.

I don't have a graphics tablet, so perhaps it is unfair of me to judge it on that score – certainly keyboard and joysticks are not able to reproduce images as accurately as CAD demands.

But Paintbox would really come into its own in the classroom. It has always been one of my complaints that arts and sciences are kept too much apart, and inevitably that leads to specialisation in one field with little knowledge about the other.

Using a computer in the art class might convince the person who is bored to tears by aggressive arcade games (as I am) that there is a lot more potential for creativity on a computer than is at first apparent.

Also, the type who curls up in horror at the thought of sitting in front of a drawing board might just be tempted by the prospect of using a micro.

If you want to paint traditional style works of art then stick to brush and canvas, as this package can be no substitute.

But there is a lot of scope for experimenting with images using a computer, and Paintbox provides a flexible way of doing just that.

Every school should have this program.

Heather Sheldrick

PLAY A BIT BELOW PAR – BUT NOT THE PROGRAM

Supergolf

Squirrel

I'VE never played golf and, having had a go at Squirrel Software's game Supergolf, it's unlikely that I ever will.

Not that it's a bad game, in fact it's very good. For your money you get an 18 hole course, a score card and a set of golf clubs.

Also, if you're as bad at it as me, you get humiliated into the bargain.

You see, no matter which club I choose from the set of nine irons, I can't get it right.

I've tried all the different strengths of swing (from one to 99) and I still can't judge it.

My ball has a terrible affinity for the bunkers or, even worse, water. And my putting is agonising to watch.

Nor does it improve matters when I get a scorecard at the end of each hole telling me how far below par I am.

It's an interesting game for up to four players, well conceived and well worth playing.

Yet, terrible though I was at it, Supergolf remained fun and left me wanting to play again. Enough said?

Nigel Peters





Well set-up workshop toolkit

BBC Micro Toolbox *BBC Soft*

THIS set of 25 utilities comes from Ian Trackman, the "Making the Most of Your Micro's" programmer extraordinaire. As you would expect, it contains some very useful programs.

They are in two sets. One contains routines that can be included in your own programs, while the other is intended purely as program development aids.

The first set contains six sorting routines, circle generating codes, three character generating/printing programs, a graphics dump and a speech unit utility. Most of these are written in Basic and are well annotated with REMs.

I particularly liked the Shape Maker program which allows one to convert a shape on the screen into user defined characters.

The second set of programs seem to be what every writer of large Basic programs on the BBC Micro has been waiting for — if he/she hasn't already written them.

There are, for instance, three utilities that help to shorten Basic programs. The first is a REM stripper which not only removes REM statements but also lines with only colons or spaces.

Follow this with a space removing program and then a packer that tucks as many statements as possible on to one line and your original program is considerably shorter, and hopefully faster.

With a disc system the whole process is easily automated and is explained in the manual.

Conversely, if you have a packed program that you would like to make understandable you can use the unpacking and spacer programs that unravel most of the mess that the above programs have created.

Add to these a cross-referencer, a variable dump, a global replacer and a resequencing program, and a good deal of the drudgery of writing in Basic is obviated.

The programs come on tape but with full instructions on how to write them on to disc.

A colleague wrote a small program which automatically transferred the programs from tape to disc for me, and this would have been a nice addition to the package.

The manual is large (208 pages) and has complete listings together with concise explanations.

This is a very useful addition to any Basic programmer's toolkit.

Alan Plume

Get to know the lie of the land

County (SM)

Bryants

TWO related programs provide a useful aid to familiarisation with local geography. For this review just County (SM) will be described. Its companion program, County (SW) deals with the south west peninsula of England.

County (SM) covers the counties of Dorset, Hampshire, West Sussex, Surrey, London, Berkshire, Wiltshire and Avon. There are two options on the menu — identifying towns, and identifying rivers or counties.

The first option displays an attractive four-colour map with the locations of 20 different towns marked on the map by a cross.

The user is prompted to find, for example, Lyme Regis. This is done by flying a small aeroplane over the map, using the cursor keys, until it is over the cross which you think marks the town you are looking for.

If the location you choose is not the correct one, then the computer responds with "That's Dorchester" or whichever town it is.

When you do get the location right, it plays a little tune and responds with "Good — you found it". After two questions you're told how long you took to correctly locate the two towns.

This part of the program is good. The aeroplane doesn't move all that fast and tends to leave a smudge when you stop over a town, but the graphics are colourful and the controls easy to use.

The second part of the program,

identifying rivers and counties, covers the rivers Frome, Stour, Avon, Wylfe, Yeo, Cherwell, Thames, Wye, Test, Itchen, Rother, Arun and Wey.

The map display has the counties shown as before, but this time they are each numbered, as are the rivers. To help you a little adjoining counties are named to provide a few ideas of scale and reference.

The user is prompted to name, for example, river R12 or county C5. If the input is wrong then the computer beeps and gives the right answer, but if it is correct then it responds with "Correct — well done!"

Every now and then you are told how long it took you to answer the last question, which helps keep you on your toes a bit, and after 10 questions you go back to the menu.

There really ought to be a scoreboard to tell you how many answers you got right, and whether you were better at the rivers or at the counties. But there isn't, so you would have to note this for yourself if you wanted to know which to practice on to improve your answers.

Overall, though, this is quite a nice and useful program. It doesn't come with any documentation, which could be useful, and isn't quite as polished as it could be, but probably represents good value for money nevertheless.

Jane Jackson

Business Games

Acornsoft

THE Business Games cassette from Acornsoft contains two business games, Stokmark and Telemark.

Stokmark allows one to eight players to deal in the shares of four different companies on the Stock Exchange. The aim is to make as much money as possible.

As in real life, a player's wealth is increased through the receipt of dividends — a share of a company's profits — or through making a capital gain if the share price rises.

Of course the share price could fall, so that a player could make a loss.

The guide accompanying the tape explains some of the terms used in investment analysis.

Using these the program produces regular reports on each player's wealth and on each share's performance so that they can plan their next moves.

The main influence on the value of the shares is whether they are being bought or sold. If there is heavy selling then this depresses the share price. If a share is sought after, however, then the price will be forced up.

As in real life, there are also random economic factors, such as strikes, which affect a share's performance and make planning difficult.

The game is a well-presented and

Make a profit with your micro

useful introduction to some investment terms, but I thought that it became rather repetitive after only a short time.

Telemark is a game for four players or teams involving the manufacturing and marketing of TV sets.

Players start with the same amount of cash and are then asked to make capital investment decisions, such as the size of the factory, which will determine the production and storage capacity of the businesses.

The larger the factory the more can be made, stored and potentially sold but the factory overheads or expenses will also rise.

The players are then asked to make production, marketing and pricing decisions, all of which can influence the profits which will be made.

For example, if your prices are set too high then other suppliers may win part of your market share.

If your prices are pitched too low then, although you may gain a large share of the market, you may not be charging enough to make a profit.

Certain random effects are also built



in to make decision making a little more difficult — and realistic.

At each stage the program checks to see if a player's decisions are feasible. There may not be enough production capacity, market share or cash to enable the plans to be fulfilled.

To help, each player is given frequent opportunities to have information vital to decision-making displayed on screen.

At the end of each round financial and market share reports are produced so that the players can see how they are getting on.

This is a good game and to be properly appreciated must be played seriously.

Rather than making decisions by blind guesswork, which will teach little and quickly becomes dull, players should carefully plan the development of their businesses.

They must ensure, for example, that they will have enough cash for future operations and that they will charge a price that will return them a profit. A pencil and paper are indispensable.

Acornsoft have obviously realised that this is an important aspect of the game and they have provided some blank charts in the program guide to help players work out their cash flows and to estimate suitable selling prices.

As a small point, I think that many people would appreciate a worked example in the program guide showing how the profits and, in particular, the balance sheets are calculated. This would help make a good game even better.

Ken Garrett

QUICK RUNS

A first look at some of the latest releases

Trafalgar: A wargame between two fleets, English and French, as in the battle of Trafalgar, for two players or one against the micro. Combat is on the basis of ship to ship engagements with cannon broadsides trying to take out the opposing guns.

When firing you have to take into consideration wind speed and direction, deck height and distance. Victory goes to the first to sink his enemy's fleet. (Squirrel)

★ ★ ★

Chuckie Egg: Moving around a multi-level hen house by climbing ladders, jumping, dropping through holes or taking convenient lifts, your task is to collect 12 eggs and as much corn as you can.

Opposing you initially are three roving birds. As the game progresses

you encounter a vicious, intelligent flying duck, which takes over and follows you relentlessly. (A & F)

★ ★ ★

Space Shuttle: Your mission, as pilot of the US Space Shuttle, is to launch it, retrieve a malfunctioning satellite and then make a safe landing. Weather conditions are preset for each "run" and you are debriefed at the end of your performance. (Microdeal)

★ ★ ★

Missile Control: By cunning use of your three missile batteries, you must defend a city from showers of enemy missile attacks.

With each successive wave the attack strengthens, incorporating planes, satellites and intelligent missiles. A game for up to four players. (Gemini)

Free software, only £225.

If you own a BBC Micro, you can now download, store and run programs (transmitted free of charge via Ceefax) with the new Teletext Adaptor, priced £225 inc. VAT.

These programs make up the BBC Telesoftware Service (which is intended to become a computer software broadcasting channel) and although primarily educational, they will soon develop into general interest and business areas.

And, as they will change every two weeks, you'll soon be able to build up a vast bank of top quality software without ever having to put your hand in your pocket.

But that's not all the adaptor has to offer. It also enables you to gain access to the normal teletext store of data. This is different to simply having a teletext TV because it means

this data can now be transferred to memory and manipulated in any way you wish (making graphs or bar charts for instance).

It's yet another development in our programme to help you fully realise your BBC Micro's potential.

If you're a credit card holder you can order the Teletext Adaptor by ringing 01-200 0200 at any time or 0933-79300 during office hours.

(You can also find out the address of your local BBC Micro dealer by calling the same numbers.)

Alternatively, you can order it by sending off the coupon below.



Technical Specifications

Access to Teletext and Telesoftware Services broadcast on U.H.F. channels E21 to E69.

Speed of max. data capture rate approx. 128k baud. (8 lines of Teletext per frame.)

Height 70mm. Width 210mm. Depth 350mm. Weight 2kg.

Colour: BBC Computer cream.

Construction: Moulded top and bottom to match BBC computer profile. ABS injection moulded plastic.

Controls: Four tuning potentiometers on rear panel.

Mains on/off switch on rear panel.

Power in 240v, 50Hz, 15w.

Operating Temperature: 10° to 35°C.

Designed and manufactured to comply with BS415 Class 1 standard.

To: BBC Microcomputers, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.

Please send me _____ BBC Teletext Adaptors at £225 each, inc. VAT and delivery. I enclose PO/cheque payable to Readers A/C, Acorn Computers Ltd, or charge my credit card.

Card Number _____
Amex/Diners/Visa/Access (Delete)

Name _____

Address _____

_____ Postcode _____

Signature _____

Registered No. 140 3810 VAT No. 215 400220

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

A joint presentation by
The Micro User & Electron User

Don't miss the great new for the Electron

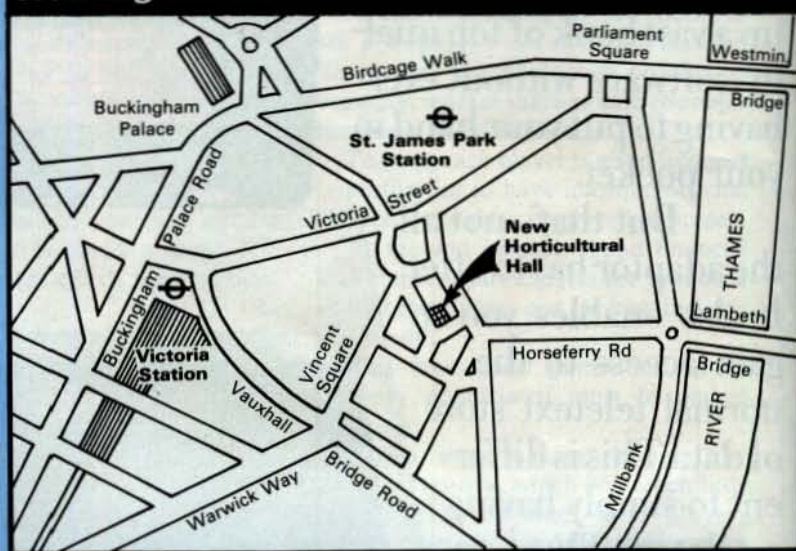
Here's your big chance to catch up on all that's been happening recently in the fast-developing world of the Electron and BBC Micro. And there's so much new to excite and intrigue you ...

NEW programs from the fertile minds of Britain's leading software writers – games galore, plus a growing number of new packages for teachers and for industrial and business users.

NEW hardware add-ons that expand even more the power and versatility of your micro.

Electronics wizards regard both the Electron and the BBC Micro as a challenge to their ingenuity. Their latest creations on display at the Electron and BBC Micro User Show will astound and delight you!

How to get there



VOUCHER
WORTH
£1

This voucher is worth £1 per person
off the normal admission price of
£3 (adults) and £2 (children)
(Valid for a maximum of 4 people)

Electron & BBC Micro User Show

10am - 6pm, Thursday, 29 March
10am - 6pm, Friday, 30 March
10am - 6pm, Saturday, 31 March
10am - 4pm, Sunday, 1 April

New Horticultural Hall
Greycoat Street, London SW1

School and College Groups

Entry only £1 per student if bookings are made in advance. Send your cheque (made payable to Database Publications) and SAE to:

Electron & BBC Micro User Show
68 Chester Road, Hazel Grove
Stockport SK7 5NY
Tel: 061-456 8383

**Spring show of all that's
and BBC Micro**

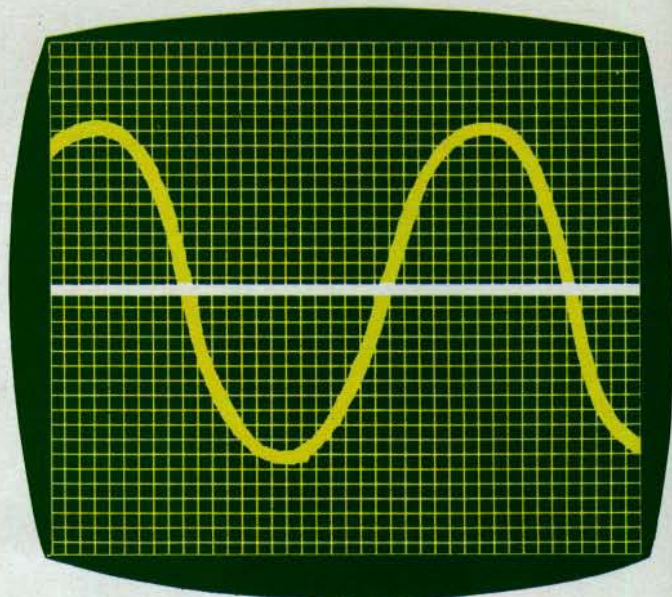
**ELECTRON &
BBC MICRO
USER SHOW**

New Horticultural Hall

(Westminster Exhibition Centre)

**Thursday to Sunday,
March 29 to April 1**

Here's an easy way to turn your Beeb into a real time oscilloscope



WHILE the BBC Micro has more additional inputs than most other computers, it cannot hope to have all the different types we might need for every situation.

This is very pleasing for me as it keeps me in employment! However, it can be quite frustrating when you find the machine will not do quite what you want.

This occurred recently when a teacher asked me if it was possible to use the BBC Micro like an oscilloscope.

"No trouble," I said, "just use the built-in analogue input port".

Well it turns out that this is fine for slow waveforms, but anything over 30 Hz and the converter is just not fast enough to cope.

As the teacher wanted to display audio waveforms to the class, something extra needed to be built.

There are many analogue to digital (A/D) conversion techniques, and they are mainly a three way compromise between speed, accuracy and cost. So on a fixed budget you have to trade off speed for accuracy.

In all fairness, the BBC Micro has done very well with 10 bits accuracy and a 10 mS conversion speed. But, good as it is, it will not cope with all situations.

In the case I've just mentioned it is not fast enough to display an audio frequency waveform. There are other applications which we will meet later on in the Bodybuilding Course where a

faster A/D converter is needed. So for this month's exercise we will look at how to add one to your micro.

The fast A/D converter board plugs into the user port and enables signals to be digitised over a range of ± 5 volts. Each sample takes about 15 μ S to acquire, and is of 8 bits accuracy.

You see we have traded speed for accuracy. With 8 bits we can get a

By MIKE COOK

number from 0 to 255 whereas with the built-in converter we can have 0 to 1023.

Although the Basic ADVAL command returns a number between 0 and 65,536, there are only 1,024 significant increments.

So the built-in converter is four times more accurate but about 600 times slower.

The built-in A/D converter uses a technique known as a dual-ramp conversion process.

This is a very good way of getting a very accurate conversion but it is notoriously slow. In fact the one in the BBC Micro is the fastest one I have come across.

We will be covering the dual ramp

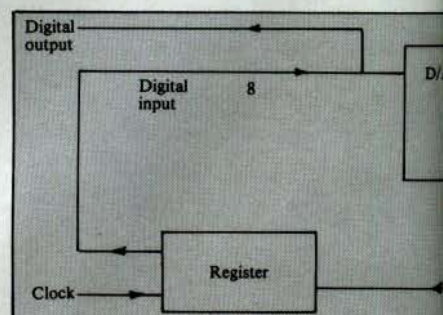


Figure 1: Block diagram of a successive approximation A to D converter

process in a later article, so we will leave it there for the moment.

The A/D converter I have used here uses what is known as a successive approximation process. Most of the required components are on one chip, the Ferranti ZN427.

Successive approximation is a technique you may be familiar with, but you may not know it by that name.

Most people owning a computer must have played a number guessing game at some time or other.

It is the one where a computer guesses a number and you have to match it.

After each guess you enter you are told whether you are high, low or just right.

You start off just guessing wildly but pretty soon you develop a successive approximation technique.

Suppose the number is in the range 1 to 100. Your first guess should be 50, half the range.

If your guess is too high the number must be between 1 and 50. So your next guess should be 25, again half the range.

You can continue halving the range and eventually you are bound to find the correct number.

The successive approximation A/D converter works in a similar way. The block diagram is shown in Figure I.

An unknown voltage is presented at the analogue input. This feeds into a comparator.

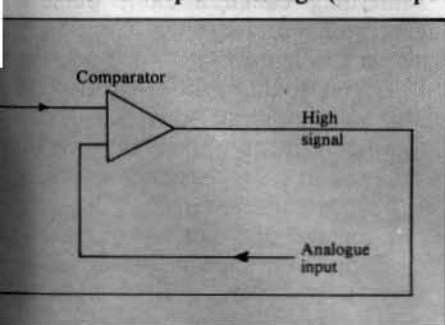
A comparator is simply an amplifier with two inputs whose output is high or low depending on which input has the higher voltage.

The second input is taken from a D/A (digital to analogue) converter.

As the name suggests this takes a digital number and converts it into a voltage. The register then makes a guess at the voltage by choosing the mid-point.

This is represented by the most significant bit of the digital input being high and the rest low.

The output of the comparator is fed back into the register which then decides whether to keep that bit high (if the input



THE BEEB BODY BUILDING COURSE

PART 13

voltage is in the upper half of the range) or set it back to low (if it is in the lower half).

The register does this for each bit in turn in order of decreasing significance (bit 6, then bit 5 and so on).

After it has made the decision on all 8 bits, the number it is left with represents the value of the input voltage.

Note however that these are in arbitrary units and are relative to the maximum voltage produced by the D/A converter.

This does not matter in many applications as all we want is a number proportional to the size of the input voltage.

The speed of conversion is governed by a clock signal.

The slowest unit in the circuit is the

comparator and the clock has to be sufficiently slow to allow it to settle.

However, as only one clock cycle is needed for each bit of accuracy (plus one to start it off) the technique is very fast.

Figure II shows the complete circuit of our fast A/D board. You will notice that as well as the ZN427 there are some other components.

The A/D chip needs feeding with a clock signal to govern its speed of operation.

This is generated by IC 2 which is a 74LS13 consisting of two 4-input Schmitt input NAND gates.

One gate is wired up as a relaxation oscillator and basically it acts as an inverter.

When there is a logic one on all the inputs, there is a logic zero on the outputs.

Conversely, when there is a logic zero on one or more inputs there is a logic one on the output.

The gates have what is known as a Schmitt input, where the threshold voltage on the input – that is the voltage needed to make the input a zero or one – depends on what logic level is currently on the output.

This difference in threshold is known as the input hysteresis.

The oscillator works by connecting

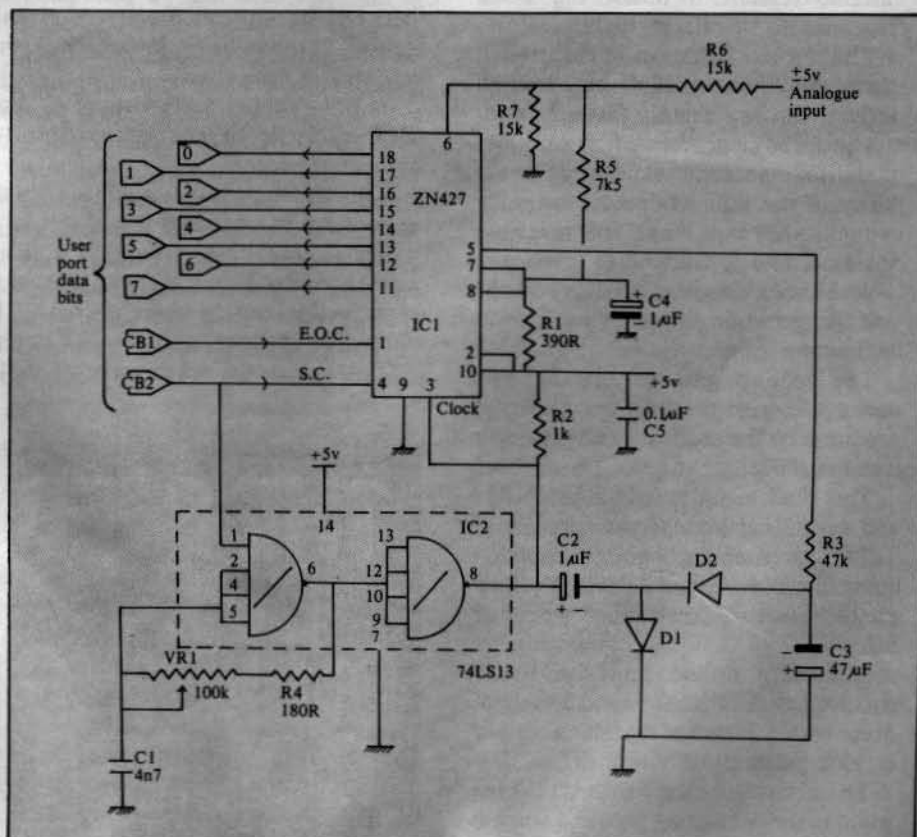


Figure II: Circuit of the fast A/D

From Page 123

the output back to the input.

If the input is low then the output must be high. But if the output is high then the input is high therefore the output must be low!

What actually happens is that the logic state of the output constantly changes or oscillates.

If there were just a direct connection between input and output the frequency of oscillation would be determined by the propagation delay of the gate.

The propagation delay is the time it takes for a change on the input of a gate to affect the output.

This alone would produce an output of too high a frequency and so we have to introduce an extra delay. This is done by using a capacitor from the inputs to earth and a resistor in the feed-back path.

So as the voltage on the output goes high the capacitor will start to charge through the resistor until it reaches the positive threshold point where it switches the output to low.

The capacitor then starts to discharge through the resistor until the negative threshold point is reached when the output goes high again.

This produces a fixed frequency clock signal on the output of the gate, shown in Figure III.

The resistor is split up into a fixed and variable resistor to allow the clock frequency to be altered slightly.

The ZN427 has a guaranteed conversion time of 15 μ s but, like all devices, can run slightly faster.

The speed depends on fine variables in the manufacture such as the exact purity of the semiconductor, the stray capacitance and what the machine operators had for lunch!

So by including the variable resistor you can get your converter working at its limit.

The second gate in the 74LS13 package is used to clean up the signal produced by the oscillator and provide a fast rise-time.

This clock signal is fed to the ZN427 and controls the conversion process.

The conversion is begun by applying a negative pulse to pin 4. This is known as the "Start of Conversion" signal or SC.

According to the data sheets, the positive edge of the SC pulse should not occur within 200ns of the falling edge of a clock pulse.

To ensure this, the SC pulse is also wired to the oscillating gate and when it goes low will force the output of the

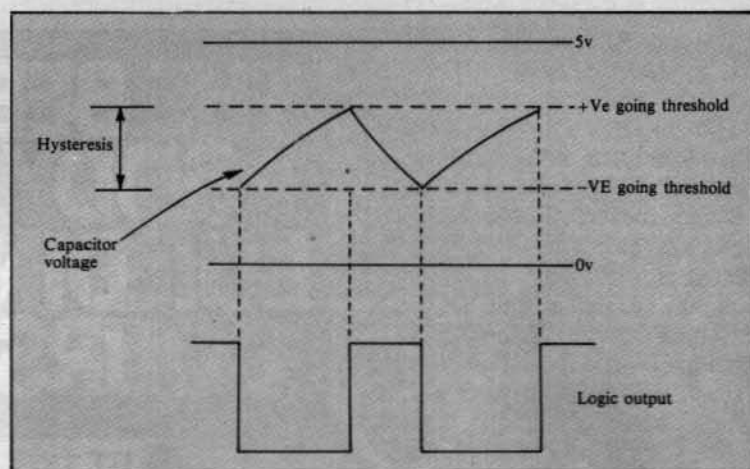


Figure III: Waveforms of a relaxation oscillator

clock to go low also. When the SC goes high the oscillator will start again.

The SC pulse is wired up to the CB2 control line which can be made to pulse every time a number is written to the B side of the VIA.

As all the VIA data pins will be inputs this is known as a dummy write as it does not matter what is written only that something is written.

When the conversion has been completed the EOC line (end of conversion line) makes a positive transition.

This is connected to CB1 and can be made to generate an interrupt or set a flag.

In Basic programs, however, it is not necessary to look at this as the delay between starting off a conversion and getting the results is longer than the conversion time itself.

In order to make any form of A/D or D/A conversion it is necessary to have a voltage reference.

This is a voltage against which everything is measured.

The ZN427 has a built in voltage reference. But if you want to put your own in this can be done on pin 7. It should be in the range 1.5 to 3.0 volts.

This is useful when several A/D

converters are being used so that they all have the same reference point.

The input circuitry consists of resistors R5-R7 which are arranged so that when the input is at earth, R6 is in parallel with R7.

As the latter pair are the same value (15k), their total resistance is halved (7k5), forming a potential divider with R5 to present half the reference voltage to the converter's input.

If the input goes below earth (negative) then the voltage on the input will drop below half way. Similarly when higher than earth it will rise to above half way.

The limits of conversion should be reached with the input voltage at ± 10 volts.

As there are resistors in the input circuitry you would have to supply in excess of ± 10 volts to do the chip any damage.

The only fly in the ointment is that the comparator in the A/D chip needs a negative supply.

This could be taken from the auxiliary power socket on the BBC computer. But there is a better way.

As the current needed on this negative supply is very small it is possible to generate it from the positive supply.

As we already have an oscillator running it is fairly easy. We use something called a diode pump to generate a negative supply. Consider the circuit in Figure IV.

The capacitor has one side connected to +5 volts and the other side to earth through a resistor. Therefore there is a voltage across the capacitor and thus it has a charge stored in it.

If one end of the capacitor suddenly drops by 5 volts then the other end must also drop by 5 volts because instantaneously there is no change in charge.

**THE BEEB
BODY
BUILDING
COURSE**

So as one end drops from 5 volts to 0 volts the other end must drop from 0 volts to -5 volts.

The capacitor will then start to discharge through the resistor.

When the capacitor is discharged (no voltage across it) the input end is taken quickly to +5 volts again.

The other end responds by trying to rise to +5 volts to preserve the charge or lack of it. However the diode D1 then starts to conduct and rapidly charges the capacitor again.

This diode is said to clamp the capacitor to earth.

In Figure II diode D1 acts in the same way with diode D2 preventing any of the negative voltage getting back to the capacitor.

Therefore the capacitor pumps charge into the circuit which is stored in C3, producing our negative supply.

An alternative explanation is that if you waggle one end of a capacitor and clamp the other to earth you will get the inverse of the wagging at the clamped end.

To be honest that's the way I think of it as it is so much easier.

So with the circuit explained we can get on with the construction.

You can make it on Veroboard and connect it up to the user port using Body Build packs 1 and 2. That's the way I constructed the prototype.

Alternatively Body Build pack 10 contains all the parts and a printed

```

10 MODE 7
20 PRINT TAB(0,5);"THE BEEB BODY
   BUILDING COURSE No. 13"
30 PRINT "By Mike Cook"
40 PRINT
50 PRINT "FAST A/D CONVERTER TEST"
60 PRINT TAB(0,12);"CURRENT VALUE"
70 ?&FE62=0
80 ?&FE6C=(?&FE6C AND &F) OR &B0
90 ?&FE60=0
100 AZ=?&FE60
110 PRINT TAB(0,10);AZ;" "
120 GOTO 90
  
```

Listing I

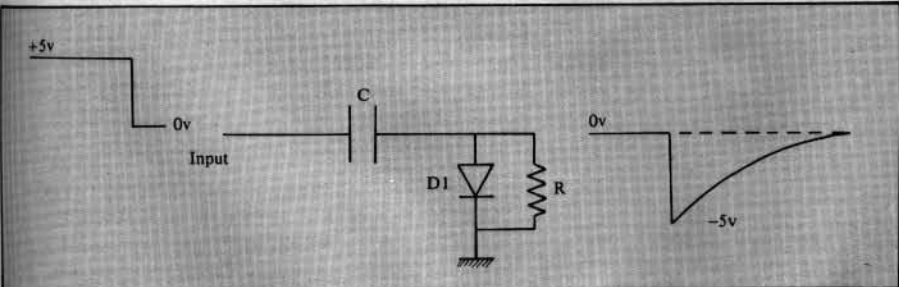


Figure IV: The voltage transitions on a capacitor

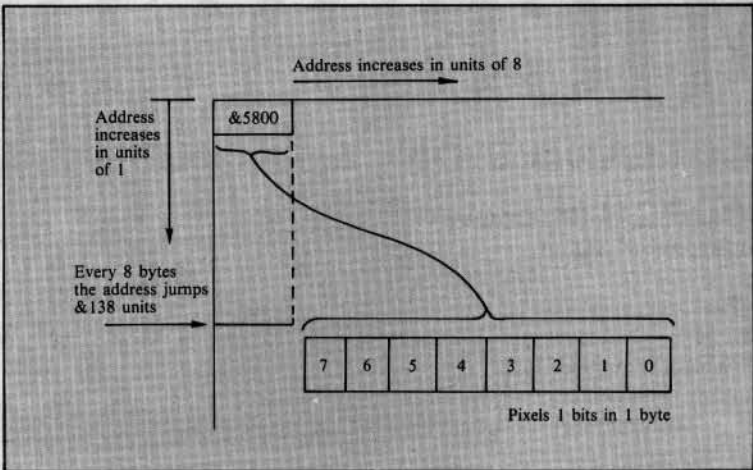


Figure V: Mode 4 address/pixel positions

circuit board.

You will still need a cable (Pack 2 or similar) to connect it up to the user port.

Just identify the component numbers on the screen printed circuit board with the component list or diagram and solder away.

The capacitors are marked with a + and the diodes are marked with a band to help you insert them the correct way round.

Having constructed it, the program in Listing I should test it out. Line 70 ensures all the data lines on the user port are inputs. Line 80 sets the CB2 line to give a SC pulse when written to without affecting any control lines for the printer (side A of the VIA).

Line 90 starts the conversion, which is completed by the time line 100 is executed.

The result is plotted on the screen and the program then loops to get another sample. Forgive the GOTO but I have not been feeling well lately.

Run the program and apply a voltage to the input. As this voltage changes the number should respond.

Now to put it to some serious use. We could arrange the converter to generate an interrupt every time a conversion is completed just like the built in converter.

But, as the conversion time is very short, the computer would spend most of its time getting samples and you would think you had a ZX80 instead of

a BBC! So we are only going to use it when it is necessary.

The program in the listing starting on Page 127 is for a digital storage oscilloscope using the fast A/D converter.

It can show signals quite clearly up to 2 KHz in real time and display even faster changes in the expanded mode.

The program works by first gathering 256 samples as fast as it can and storing them in memory. While it is doing this the interrupts are disabled so that the time between each sample is constant.

It then displays these samples as a dot plot, at the same time rubbing out the dot from the previous scan.

At first I tried using the operating system OSBYTE calls. This resulted in the program taking too long to run. The display was not updated fast enough.

So I had to write the program so that it altered the display by writing directly to memory.

To do this we need to know how the pixels on the screen relate to the memory locations. This changes depending what mode you are using.

I have written the program to use Mode 4 and it cannot easily be changed.

Figure V shows the relationship between address locations and screen position.

Each bit in a byte corresponds to one pixel. So if we set bit 7 in memory location &5800, the top left hand pixel will come on.

As we move down the column the address location increases by one until it reaches &5807 and then the address jumps by &138. So the one under that is at address &5940.

In the X direction the address increases in steps of 8 from the first column.

It is obviously time consuming to make the calculation from an X-Y

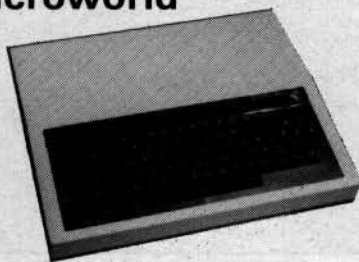
MICROWORLD



SCOTLAND'S ONLY EXCLUSIVE BBC MICRO DEALER

EDINBURGH Microworld

12 Leven Street
Tollcross
Edinburgh
031-228 1111
Telex 72355 CLACON G



Model B with latest 1.2
Operating System £399.00
Model B with Disc Interface ... £469.00
Model B with Econet £446.00
ALL EX-STOCK

SHINWA-CTI CP80

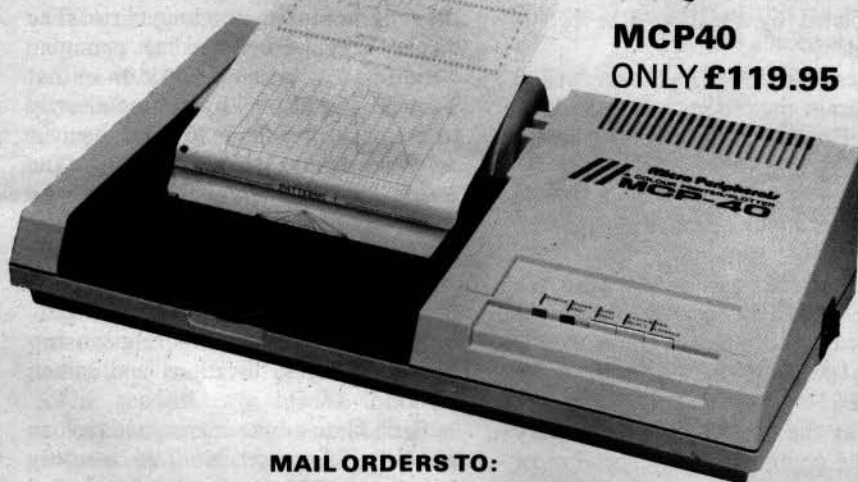
FULL FEATURED
80 COLUMN MATRIX PRINTER
(FRICTION AND
TRACTOR FEED)

ONLY £249
INC. VAT,
CARR. £6

FULL ONE YEAR WARRANTY



4 COLOUR GRAPHIC
PRINTER/PLOTTER



MCP40
ONLY £119.95

MAIL ORDERS TO:

MICROWORLD

(Authorised BBC Dealer and Service Centre)
12 LEVEN STREET, EDINBURGH,
(Nr. Kings Theatre, Tollcross)
TEL: 031-228 1111 (M-S 9-5.30)

Carriage £6 per item, all prices include VAT, please check
price before ordering. Cheques must be made payable to
Andrew Whyte and Son Ltd.



EDUCATIONAL & BULK
DISCOUNTS AVAILABLE, ALSO
COME AND SEE ECONET IN
OUR SHOWROOM

DISTRIBUTORS FOR SHINWA CP80 AND MCP40

GLASGOW Microworld

11 Bath Street
Glasgow G2
041-332 1116

ABERDEEN Microworld

77/83 Holborn Street
Aberdeen
OPEN SOON!

DISC DRIVES

ALL TEAC SLIMLINE UNITS

Single Drives

40 track 100K Cumana CS100 £225.00
40 track 200K £245.00
40/80 track 200K £207.00
40/80 track 400K £345.00
80 track 200K Cumana CS200 £259.00

Dual Drives

40 track 200K £375.00
40/80 track 400K £430.00
40/80 track 800K £600.00

Prices include leads, formatter,
manual and P.S.U.

MICROWORLD DISC DRIVES

MW 400K 40/80 track switched .. £345.00
MW 800K 40/80 track switched .. £515.00
Above include P.S.U. format disc manual
and fit under BBC (Torch style)

PRINTERS

Shinwa CP80 £249.00
Seikosha GP100A £215.00
Seikosha GP250X £271.00
Seikosha GP700 4-colour £425.00
Epson FX80 £415.00
Epson RX80 £279.00
Epson RX80F/T £315.00
Juki 6100 £415.00
Silver Reed Daisywheel *only* £315.00
MCP40 colour printer/plotter £119.95
Interface Cable for above £15.00

MONITORS

Sanyo 14" colour £225.00
Sanyo 14" colour med. res. £313.00
Sanyo 14" colour high res. £479.00
Microvitec 14" colour £239.00
Novex 12" amber £105.00
Zenith 12" green £85.00
Sanyo 12" green £82.50
BMC 12" green £110.00
BMCTurntable £15.00

SOFTWARE: Full range of ACORNSOFT, IJK,
MICRO-POWER, SUPERIOR SOFTWARE,
ALLIGATA, GEMINI, plus good range of
EDUCATIONAL software. Please call or SAE
for list.

(Add 50p post per order.)

From Page 125

co-ordinate location to an address for each point plotted. So we do most of the calculations beforehand and store them in a look-up table.

This look-up table of the address of the first byte in each column is performed in lines 220 to 280.

The most significant byte is stored in a table starting at address &5700, and the least significant byte in a table at &5600. It is more convenient to split the values up in this way.

As we are plotting every possible X value we have to keep track of the number to add to the first column address.

A mask with a single bit in it is stored at &86 to tell us which bit in the pixel to change.

Whenever we plot a bit we store the address in a table (&5400) so that the next time round we can use the address directly to erase the point.

The first time the routine is entered there is no point to erase and so this table is filled with dummy points in the procedure WIPE. The addresses used are in ROM and so nothing will be affected.

This results in a very fast and responsive display. Try to alter the speed of the clock oscillator so that the data is gathered as fast as possible.

In order to view a stable trace it is necessary to start taking the samples from the same point on the waveform

THE BEEB BODY BUILDING COURSE

each scan.

This is made possible by supplying a trigger or threshold point.

The waveform must cross this point on a rising edge to trigger the data scan. If the waveform never reaches this point then there will be no display and the only way out is to press Break.

When the trigger point is set to zero there is no waiting, the scan proceeds immediately.

By pressing the space bar the trace can be frozen. You can then alter the trigger point or expand the scale of what you have. The dots may be isolated or joined up.

The scale factor may be any integer from 1 (no scaling) to 100 (quite a lot). The display always starts from the trigger point. You can make this a variable as well if you like. It is found in line 1290.

Well that just about raps it up for this month. Like all projects it is just a starting point for you.

You can calibrate the data capture rate so that you can guide a cursor through a frozen display and have a read-out of the time and amplitude at that point.

You could even include more complex triggering such as negative slope and delayed triggering. It is up to you. The hardware is there. It's just a matter of software.

The applications of this board are not just limited to displaying waveforms. I already have at least two projects in mind that will use this board so you should get your money's worth from it.

Well I'm not superstitious, but it's nice to get number 13 out of the way. See you next month.

Body Build Pack No. 10 consists of:

IC1 ZN427 A/D converter; IC2 74LS13 NAND Gate; R1 390R; R2 1k R3 47k; R4 180R; R5 7k5 1%; R6 15k 1%; R7 15k 1%; VR1 100R preset; C1 4n7; C2 1uF electro; C4 1uF tant; C5 0.1uF disc ceramic; D1 D2 1N4148 diodes; 18 pin IC socket; 14 pin IC socket; 20 way IDC Header; Fast A/D printed circuit board; 3 way terminal strip.

● You can order this pack and previous ones with the order form on Page 132.

Oscilloscope listing

```
10 MODE 4
20 HIMEM =%52FF
30 DIM CODEX &90
40 PRINT TAB(0,5);"THE BEEB BODY
   BUILDING COURSE"
50 PRINT "Number 13 March 1984"
60 PRINT
   :PRINT
70 PRINT "By Mike Cook"
80 PRINT
90 PRINT
100 PRINT "FAST A/D CONVERTER OSCILLO
   SCOPE"
110 PRINT
120 PRINT "PRESS ANY KEY TO START"
130 A$=GET$
140 PRINT
150 PRINT "INITIALISING"
160 ?&FE62=0
170 ?&FE6C=(?&FE6C AND &F) OR &B0
```

```
180 ?&86=&80
   :?&80=00
   :?&81=00
190 ?&FE6E=&90
200 MZ=&5600
210 FOR AZ=0 TO 31
220 FOR BZ=0 TO 7
230 TZ=AZ*%140+BZ*%5800
240 ?MZ=TZ MOD 256
250 MZ?%100=TZ DIV 256
260 MZ=MZ+1
270 NEXT
280 NEXT
290 FOR IZ=0 TO 3 STEP 3
300 PZ=CODEX
```

```
310 I
320 OPT IZ
330 .START SEI
340 LDA &81 \GET TRIGGER VAL UE
350 CMP #0
360 BEQ NTRIG \TO NO TRIGGER POINT
370 \WAIT FOR A POSITIVE TRANSITION
   OF THE TRIGGER POINT
380 .TLOW JSR SGET \LOOP TILL BELOW
   TRIGGER
390 CMP &81
400 BCS TLOW
410 .THI JSR SGET \LOOP TILL ABOVE
   TRIGGER
420 CMP &81
430 BCC THI
440 .NTRIG LDX #0
```

This listing is included in this month's cassette tape offer. See order form on Page 169.

Turn to Page 130

LVL COMPUTERTOWN

Whether its your first computer or whether you're already an enthusiast, LVL COMPUTERTOWN offers you the quality of service you expect from experts. If you invest money, you go to a bank or a broker - a specialist who can guide and advise you on the best return for your capital. At LVL COMPUTERTOWN we're specialists too. We're there to help guide you through the micro maze, keep you up to date on innovations, help you get the best value for money, whether your computer is for you, your children or your business. Your computer can change your life - make sure you change it for the better: Come and talk to the experts and move into micros with LVL COMPUTERTOWN

PRINTERS



Seikosha GPI00A	238.05
Silver Reed EX500	
Parallel	343.85
Silver Reed EX500	
Serial	378.35
Silver Reed EX550	
Parallel	534.75
Silver Reed EX550	
Serial	569.25
Epson RX80	320.85
Epson FX80	503.70
Epson RX80 (F/T)	366.85
Epson MX100 (B2 Col)	546.25
Epson FX100	654.35

COLOUR LIGHTPEN



The lightpen is compact, reliable and comes in a rugged metal case providing physical and electronic protection. Its sensitivity can be adjusted to match any make of TV screen, giving the highest levels of accuracy.

The lightpen package consists of the lightpen, an interface unit, introductory software on cassette and a user guide.

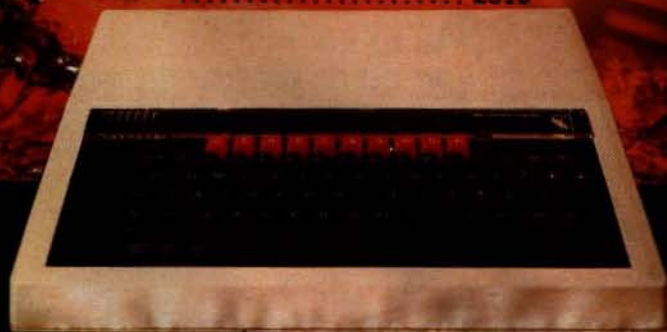
£45.95



MONITORS

BBC MICROCOMPUTER

MODEL A	£299
MODEL B	£399
MODEL B with ECONET	£446
MODEL B with DOS	£469
Model B with DOS & ECONET	
.....	£516



SABA 14" COLOUR MONITOR/
COLOUR TV.

£274.45

MICROVITEC 14" Colour Monitor
£247.25

DECCACOLOUR

14" Colour Monitor
£247.25



SANYO

12" Green Screen
£102.35

CASSETTE RECORDERS



£39.95



£734.85

A REFLECTION OF SUPERIORITY

The Bell & Howell/LVL Computer Compatible Data Recorder

- Automatic Level Control
- Automatic Tape Stop
- Tape Counter
- Remote Motor Control

TRI-WRITER

- * IT'S A PORTABLE COMPUTER TERMINAL!
- * IT'S A LETTER QUALITY COMPUTER PRINTER
- * IT'S A FULL FEATURE ELECTRONIC TYPEWRITER

SOFTWARE

DESIGNED FOR THE BBC MICROCOMPUTER

LANGUAGES	
LISP	£16.85
FORTH	£16.85
GAMES	
Monsters	£9.95
Snapper	£9.95
Planetoid	£9.95
Arcade Action	£11.90
Rocket Raid	£9.95
Meteors	£9.95
Arcadians	£9.95
Sliding-Block Puzzle	£9.95
Cube Master	£9.95
Starship Command	£9.95
Snooker	£9.95
Super Invaders	£9.95
Hopper	£9.95
Colditz	£9.95
Doctor Who	£10.00
White Knight II	£10.00
Missile Base	£9.95
Draughts & Reversi	£9.95

ADVENTURES	
Philosophers Quest	£9.95
Castle of Riddles	£9.95
Countdown to Doom	£9.95
Sphinx Adventure	£9.95

GENERAL	
Desk Diary	£9.95
Creative Graphics	£9.95
Graphs & Charts	£9.95

Tool Box	£21.00
Record Keeper	£13.80
Magic Garden	£9.95

EDUCATIONAL	
Map References	£7.50
Lasermaths	£7.50
Classmaster	£20.00
Algebraic Manipulation	£9.95
Word Sequencing	£11.90
Missing Signs	£11.90
Number Balance	£11.90
Word Hunt	£11.90
Density Circuit	£11.90
Chemical Analysis	£13.80
Chemical Structures	£13.80
Jars	£11.90
Vu-Type	£16.10

BOOKS

GENERAL	
Programing for the BBC	£8.95
Advanced User Guide	£12.95

ACORN	
Creative Graphics	£7.50
Graphs and Charts	£7.50
Forth Book	£7.50
Lisp Book	£7.50
View Guide	£2.50
Into View	£2.50
BCPL User Manual	£15.00

BBC	
The Computer Book	£6.75
The Book of Listings	£3.75
30hr. Basic	£5.95
Beyond Basic	£7.25
The Friendly Computer	£4.50
Sound & Graphics	£7.95

ALL PRICES INCLUDE VAT.

The items featured represent a very small selection from our vast product range.

Further information of both product and services available can be obtained by telephoning or visiting your nearest LVL Computertown Dealer.

CHESHIRE

C-TECH SOFTWARE
184, Market St.
HYDE
Cheshire
061 366 8223
• COMPUTER CITY
78, Victoria Rd.
WIDNES
Cheshire
051 420 3333
• OAKLEAF COMPUTERS
100, Boughton
CHESTER
0244 310099

CUMBRIA

• THE COMPUTER SHOP
56/58 Lowther St.
CARLISLE
Cumbria
0228 27710

ESSEX

A.C.L.
1, Northmall
GRAYS, ESSEX
0375 78834
BROADWAY MUSIC
AND VISION
Woodford Green
ESSEX
01 504 7500

GREATER MANCHESTER

• LOMAX
8, Exchange St.
St. Annes Square
MANCHESTER
061 832 6167
SPURTREE COMPUTING LTD
Council Buildings,
Teme Street,
TENBURY WELLS,
Worcestershire
0584 811353/811304

WORCS

MERSEYSIDE

• THORNGUARD
46, Pensby Rd.
HESWALL
The Wirral,
Merseyside
051 342 7516
NOTT'S
• BASIC BUS. SYS
Trent Boulevard
WEST BRIDGFORD
Nottingham
0602 819713
S P ELECTRONICS
48, Linby Rd.
HUCKNALL
Notts
0602 640377

LEASALINK VIEWDATA Ltd
230, Derby Rd.
STAPLEFORD
Notts
0602 399484

OXFORD

ABSOLUTE SOUND
AND VIDEO (Oxford) Ltd
19, Old High St. Headington

OXFORD

0865 65961

AVON

K & K COMPUTERS
32, Alfred Street,
WESTON
SUPERMARE
Avon
0934 419324
COLSTON COMPUTER
CENTRE LTD
The Colston Centre
11, Colston Ave.
BRISTOL
0272 276619

WARWICKSHIRE

CARVELL
9, Bank St.
RUGBY
Warwickshire
0788 65275

WEST MIDLANDS

RICHARD MORRIS
523, Bearswood Rd.
Smethwick
WARLEY
021 429 1161
JBC MICRO SERVICES
200 Earlsdon Ave.
Nth. Earlsdon
COVENTRY
0203 73813

WILTSHIRE

WILTSHIRE MICRO
CENTRE
Unit 6,
Central Trading Estate,
Signal Way,
Old Town.
SWINDON
0793 612299

BUCKS

HI-VU ELECTRONICS
38, Church St. Wolverton
MILTON KEYNES
Bedford
0908 312808

SUSSEX

CJE MICROS
78, Brighton Rd.
WORTHING
West Sussex
0903 213900

ISLE OF WIGHT

EXCELL
4, Foreland Rd.
BEMBRIDGE
Isle of Wight
098 387 2578

YOUR LOCAL



DEALER

HEREFORD

KEMPSONS
26, St. Owen St.
HEREFORD
0432 273480

KENT

KENT MICRO
57, Union St.
MAIDSTONE
Kent
0622 52784
GRAVENSAND
COMPUTERS
39, The Terrace
GRAVENSAND
0474 50677

NORTHANTS

M.A. ELECTRICAL
7, High St.
IRLINGBORO
N.Hants
0933 650133

LEICESTER

PERCY LORD & SON
63, Blaby Rd.
WIGSTON
Leicester
0533 785033

LINCOLNSHIRE

• OAKLEAF COMPUTERS
121, Dudley Rd.
GRANTHAM
0436 30281

LONDON

CANNONBURY RADIO
185 Upper St.
ISLINGTON N1
London
01 226 9392
PAUL ELECTRICAL
250/2, Grand Drive
Raynes Park.
LONDON SW20
01 542 6546
WOODS RADIO
257, Lavender Hill.
Battersea.
LONDON
01 228 1768

SALOP

MEDUCOTT BROS
53, Mardol
SHREWSBURY
Shropshire
0743 3060

SUFFOLK

SJ EMERY & CO
10, Market Place
BUNGAY,
Suffolk
0986 2141

IRELAND

EVERYMAN COMPUTER
SERVICES
BALLYMONEY
Co. Antrim
N. Ireland
026 56 62658
NEWBURN
ELECTRONICS
BALLYCARRY
Co. Antrim
09603 78330

STAFFS

JW BAGNALL
18, Salter St.
STAFFORD
0785 3420

KIRKLANDG

City Rd. Fenton
STOKE ON TRENT
0782 415787

COMPUTERAMA

59, Foregate St.
STAFFORD
0785 41899

SURREY

• HASLEMERE COMPS
25, Junction Place.
HASLEMERE
Surrey
0428 53850
P & H ELECTRONICS
5, The Parade,
Reading Road,
YATELEY
Surrey
0252 - 877 222
* Spectrum Members

LANCASHIRE

• P.V. MICROS
38A, Water St.
ACCINGTON
Lancs
0254 36521
Home & Business
Computers Ltd
54, Yorkshire Street.
OLDHAM
061 633 1608
Home & Business
Computers (RCH) Ltd
73, Yorkshire Street,
ROCHDALE
0706 344654

WALES

BUCON
18, Mansel St.
SWANSEA
0792 467980
SIR
91, Whitchurch Rd
Cyncoed
CARDIFF
Wales
0222 621813

THE COMPUTER SHOP

41, The Hayes,
CARDIFF,
Wales.
0222 26666

SCOTLAND

COMMSCOT
30, Gordon St.
GLASGOW
041 226 4878

NORTH LAND

NEWTONS
Main St.
SEAHOUSES
0665 720307

ALLIGATA THE SOFTWARE
WITH BITE
BRINGS YOU

DAMBUSTERS

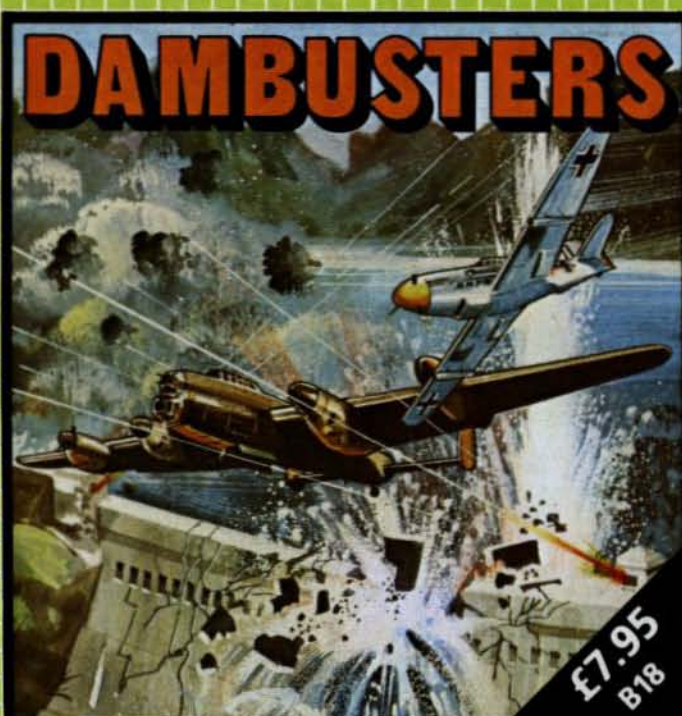
THE
DEVASTATING
NEW GAME
FOR
BBC (Model B)

Alligata presents a superb range of software products that are designed specially for you. Games that cleverly combine full machine code and high resolution, full colour graphics to create hours of fun and excitement. And utilities that have been developed to open new doors and help get the best from your BBC (Model B) micro. If it's to be outstanding quality and amazing value for money then Alligata has to be your choice.

Send a stamped addressed envelope for our full colour catalogue which gives details of the complete range.

WRITE OR PHONE
YOUR ORDER TODAY!

also available from all
good software stockists.



Harried by night-fighters, bombarded by heavy anti-aircraft fire pilot your bomber through the treacherous valley and deliver the revolutionary bouncing bomb on its path of destruction.

FREE
COMPETITION
WIN A TRIP
TO GERMANY

The highest scoring player on Dambusters will win a free holiday in Germany accompanied by a friend. Full details and entry form are available with every Dambusters program. So hurry, get your copy today and start practising.

ALSO AVAILABLE

B19 NEANDERTHAL MAN £7.95

Relive the dangers of primitive man — whilst foraging for food for your family you've only a spear to protect your family from the prehistoric monsters.

B07 LUNAR RESCUE £7.95

Land your moon buggy and rescue a precious cargo, destroying all opposition on the way; finding your way back to the mother ship start again against greater odds.

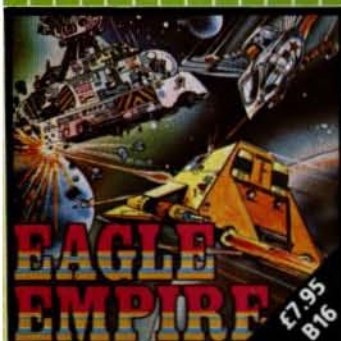
B12 PRIMARY ART £7.95

Create a picture to be proud of — place pre-programmed shapes in any position, any size or any colour. Features free-hand drawing and animation effects.

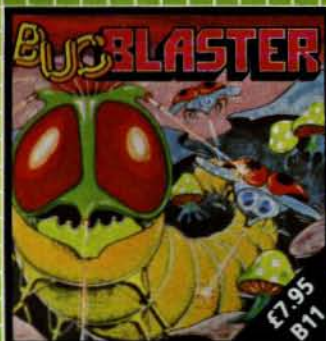
B03 DMON £7.95

Disk **£11.95 ROM £19.95**

A superb machine code monitor and disassembler available on BBC. Features: Full disassembler with ASCII dump, full hex dump with ASCII, reads any ROM, edits any byte of RAM, and many more.



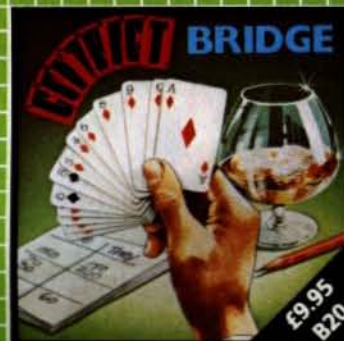
Fight your way through four action packed levels of attack from the menacing phoenix and battle armed eagles, before you can blast to destruction the heavily armoured and strongly defended Eagle Empire.



A superb action packed arcade special. A really fast implementation of the splendid "centipede". Features include spiders, mushrooms, centipedes and the mushroom poisoning scorpion affectionately known as "Brian".



Qualify in under 60 seconds for the race of a lifetime — fantastic speeds, death-defying manoeuvres and a narrowing circuit — an exacting challenge for a future world champion.



The ideal opportunity to improve your technique in a sophisticated program where the computer bids and plays the other three hands.

Despatch is normally made on receipt of order and should reach you within 7 days.

INDICATE PROGRAMS REQUIRED

B18 ☐ B16 ☐ B11 ☐ B15 ☐ B20 ☐ B19 ☐ B07 ☐ B12 ☐ B03 ☐

I enclose cheque/PO* for £ _____ Charge my Access/Visa £ _____

Card No. _____ Signature _____

Name _____

Address _____

*payable to Superior Systems Ltd., 178 West Street, Sheffield S1 4ET.
*allow 75p for post and packaging.

Alligata

Alligata Software Ltd. 178 West Street,
Sheffield S1 4ET. Tel: (0742) 755005

THE BEEB BODY BUILDING COURSE

From Page 127

```

450 \READ IN 256 SAMPLES
460 .SAMP JSR SGET
470 STA &5300,X
480 INX
490 BNE SAMP
500 CLI
510 \DISPLAY SAMPLES
520 .SLINE LDX #0
530 STX &87
540 .LOOP LDX &80
550 \GET ADDRESS OF POINT TO ERASE
560 LDA &5400,X \GET LSB OF ERASE
    POINT
570 STA &82
580 LDA &5500,X \GET MSB OF ERASE
    POINT
590 STA &83
600 LDA &5300,X \GET VAL UE TO PLOT
610 EOR &FF \INVERT TO COMPENSATE
620 TAY
630 LDA &5600,Y \LOOK UP LSB OF
    FIRST COLUM
640 CLC
650 ADC &87 \ADD X VAL UE
660 STA &84 \STORE MSB OF PLOT ADDRESS
670 STA &5400,X \STORE ERASE ADDRESS
680 LDA &5700,Y \LOOK UP MSB OF
    FIRST COLUM
690 ADC #0 \ADD X VAL UE
700 STA &85 \STORE MSB OF PLOT ADDRESS
710 STA &5500,X \STORE ERASE ADDRESS
720 LDX #0
730 \REM OVE OLD POINT
740 LDA (&82,X) \GET OLD DISPLAY
    BYTE
750 EOR &86 \INVERT APPROPRIATE
    BIT
760 STA (&82,X) \WRITE TO SCREEN
770 \PLOT NEW POINT ON THE SCREEN
780 LDA (&84,X) \GET DISPLAY BYTE
790 OR A &86 \SET APPROPRIATE BIT
800 STA (&84,X) \WRITE TO SCREEN
810 \MOVE POINTERS TO NEXT X POSITION
820 INC &80 \X POINTER
830 ROR &86 \PIXEL MASK
840 BCC LOOP
850 LDA &80 \RESTORE MASK BIT
860 STA &86
870 LDA &7 \ADD 8 TO X VAL UE

```

```

880 ADC &87 \IT IS 8 AS CARRY IS
    SET
890 STA &87
900 BNE LOOP \LOOP IF NOT FINISHED
    ALL POINTS
910 LDA #129
920 LDX &9D
930 LDY &FF \TEST FOR SPACE BAR
940 JSR &FFF4
950 TXA
960 CMP &FF
970 BNE START
980 RTS \FINISH WHEN SPACE PRESSED
990 .SGET LDA &10 \SUBROUTINE
    TO GET A SAMPLE
1000 STA &FE60 \START CONVERSION
1010 .HOLD BIT &FE6D
1020 BEQ HOLD \LOOP TILL +VE TRANSITIO
    N OF CB1
1030 LDA &FE60
1040 RTS
1050 J
1060 NEXT
1070 CLS
1080 VDU 24,0;0;1023;1023;
1090 VDU 28,32,31,39,0
1100 CLG
1110 PROC_SETUP
1120 PRINT "Expand"
1130 PRINT "Trigger"
1140 PRINT "Run"
1150 PRINT "?";
1160 A$=GET$
1170 IF A$="R"
    THEN PROC_WIPE
    :PROC_SETUP
    :PRINT "RUNNING"

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```

:CALL CODEX
:PRINT
:PRINT "NOW:--"
:GOTO 1120
1180 IF A$="T"
    THEN PRINT
    :INPUT "VALUE",TX
    :?&81=TX
    :GOTO 1120
1190 IF A$(<) "E"
    THEN 1160
1200 PRINT
1210 PRINT "SCALE"
1220 INPUT SX
1230 IF SX<1 OR SX>100
    THEN PRINT "TOO MUCH"
    :GOTO 1210
1240 PRINT "JOINED ?"
1250 A$=GET$
1260 IF A$="Y"
    THEN JX=5
    ELSE JX=69
1270 PX=&5300
1280 CLG
1290 XZ=-SX*4
1300 MOVE 0,?PX*4
1310 REPEAT
1320 XZ=XZ+SX*4
1330 PLOT JX,XZ,?PX*4
1340 PX=PX+1
1350 UNTIL XZ>1019
1360 GOTO 1120
1370 DEF PROC_WIPE
1380 CLG
1390 FOR AZ=&5400 TO &55FF
1400 ?AZ=&C0
1410 NEXT
1420 ENDPROC
1430 DEF PROC_SETUP
1440 CLS
1450 PRINT
1460 PRINT "SCOPE "
1470 PRINT
1480 PRINT "TRIG ";?&81
1490 PRINT
1500 PRINT "SPACE TO";
1510 PRINT "FREEZE"
1520 PRINT "TRACE"
1530 PRINT
1540 ENDP

```


A black and white illustration of a right hand holding a pen, poised to write. The hand is wearing a suit sleeve with a cuff. Above the hand, the words "WORK ON" are partially visible in a large, bold, sans-serif font. A thick, curved line arches over the hand and pen. The background is a textured, light gray.

USING a lightpen really DOES make light work of entering data into your BBC Micro.

Painting on the screen or selecting options comes naturally with *The Micro User* lightpen.

Children in particular find it easy to communicate with a micro this way.

With our ready-assembled lightpen comes full details of how to use it in your own programs PLUS three pieces of software to get you started:

- **Pentest** – to set things up for your own micro.
- **Pendraw** – an enthralling painting program.
- **Penbell** – an entertaining musical diversion.

All in all, *The Micro User* lightpen is a really versatile add-on for your BBC Micro, with lots of possibilities.

If you're looking for new ideas, try Mike Cook's article on page 141 of this issue. He shows you how to achieve what many people thought impossible — single pixel resolution!

What the Beeb Body Building packs contain

● **Packs 1 and 2:** Really use your User Port! These two packs let you safely and simply join your micro to the outside world. The best way to learn about interfacing.

● **Packs 4 and 5:** Control mains equipment in complete electrical isolation from your micro. Pack 4 is rated at 4 amps, pack 5 at 10 amps.

● **Pack 6:** All the electronic components you'll need to construct the Micro User light pen, with its special screen-sensing circuit.

● **Pack 7:** *Two fascinating experiments for schools and the amateur scientist: investigate the*

behaviour of a pendulum and study capacitor discharge.

● **Pack 8:** *A versatile sound to pattern converter. Its many uses include running a light show with your BBC Micro. It will also make the micro a resident fixture in many music classes.*

● **Pack 9:** *Make sure you remember all those vital appointments and anniversaries with the help of this real time clock.*

● **Pack 10:** *A high speed A/D for the BBC Micro with many applications. For instance, you can turn your microcomputer into an oscilloscope!*

Also available are a fully-assembled light pen, sound-to-pattern converter and real time clock. For a small extra charge constructors who run into difficulty assembling pack 8 can send it in for testing. It will be returned fully operational.

YOUR ORDER FORM

**for the
Beeb Body
Building
packs**

Please send me:

Pack 1 @ £9.95
Pack 2 @ £9.95
Pack 3 @ £9.95
Pack 4 @ £9.95
Pack 5 @ £12.95
Pack 6 @ £13.65
Pack 7 @ £15.50
Pack 8 @ £16.55
Pack 9 @ £28.50
Pack 10 @ £24.95

Described in issue

July 1983 page 83
 July 1983 page 83
 August 1983 page 85
 Sept 1983 page 91
 Sept 1983 page 91
 October 1983 page 69
 November 1983 page 71
 December 1983 page 95
 February 1984 page 123
 March 1984 page 132

Assembled light pen @ £18.35 October 1983 page 69
Assembled sound to pattern converter @ £22.30
Assembled real time clock £31.00
Testing sound to pattern converter @ £9.70

**Postage and packing
FREE if more than
one pack is ordered*

Cheque to be made payable to Database Publications
All prices include VAT

No.	Amount
-----	--------

☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£
☐	£

£1.00*

Total £

Name

Address

POST TO: BBC Packs, Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Please allow up to 28 days for delivery

Printer Monitor ROM *Watford*

Give your printer more brains than it was born with

THE Watford Printer Monitor ROM is a very interesting new product which positively reeks of Cambridge knowledge engineering.

The BBC MOS - Magnificent Operating System - makes provision for a printer driver routine to be attached to the MOS to which all characters intended for a printer will be sent.

This is to allow printers which either do not conform to the Centronics or RS432 interface standards to be attached to the BBC Micro. Or, as in this instance, to give the printer more intelligence than it was born with.

The monitor performs three functions:

1. It can be set up to print with a left margin and top and bottom margins and to provide form feed and other paper feeding commands on printers which do not have these functions built in.
2. It will replace multiple, forgettable control codes for the printer's functions by single codes.
3. It will print user defined characters - provided the printer has a graphics mode which can be switched on and off in the middle of a line.

The ROM is supplied with a 50 page manual and a function key strip for your printer. The function keys are used to provide manual access to a range of printer functions - form feed, line feed, setting margins, selecting a character set and so on.

The manual is written at a high level

and clearly the author is an expert on the BBC MOS.

However, fascinating though the technical notes are, the non-expert user, and even some who have been publicly exhibited as experts, find it hard going.

It needs quite a lot of digging to get things to work. Using the codes to turn on and off the various printer fonts is quite easy but when it gets on to setting margins it is difficult to find out how it should be done.

Setting up the monitor is however, quite easy. It needs the following commands:

● ***PRAM1** or **<1><D><D BREAK>** to allocate workspace. When using a word processor it is best to choose the private workspace option as it is usually not clear what part of memory which may be free under Basic will also be free under the word processor.

● ***PRINTER** <printer code> to select the required set of printer functions.

● ***PAPER66** or ***PAPER72** or ***PAPERCON** to choose a form length and top and bottom margins. The latter is for use with word processors and stops the Printer ROM interfering with the word processor's page layout.

● ***MARGIN hh** to select a left margin - 0 to be selected when using a word processor.

Using ***HELP STATUS** will now show that everything is in order. It will say:

1 private page

PMON parallel printer selected.

"1 private page" means that the machine operating system has given it a page of memory which, if the other ROMs are well behaved, will be kept for the printer ROM's use.

"PMON parallel printer selected" means that the printer is being assumed

to be connected to the Centronics interface. If this is not so then issuing the command ***FX5,6** will select the serial (RS423 or RS232C) output routines.

The printer monitor is now in control of the printer and every character sent to the printer - selected as usual by VDU 2 or CTRL-B - will pass through the monitor and be checked for job codes.

These are character codes which are not printed as characters but interpreted by the printer monitor as a command.

The job codes are detailed in the appendix corresponding to the printer type selected.

For instance, to use an Epson FX-80 appendix 6, for printer type EPb, gives an introductory discussion of what the printer monitor does and what is left to the printer's own functions, followed by a list of the character codes sent to the printer which are intercepted and interpreted by the monitor.

Without the printer monitor to start printing in italics you would have to send ??? and, what is worse, find it in the manual.

With the printer monitor you simply send code 184 and return to the normal font with the code 168.

The ROM recognises nine printers - Seikosha GP100, Tandy LPVII, DMP100 and DMP200, NEC PC8023 and Epson FX, RX and MX printers.

It will also work with the Seikosha GP80 and Tandy DMP120 but these do not support some of the functions of their more expensive or newer brethren, so the full range provided with the ROM cannot be used.

As has been mentioned before, it can be used with word processors. Unfortunately, although it can be used with Wordwise (using the Output Control code command) it cannot be used with View (with the Highlight commands).

It also seems unlikely that it can be used with Merlin Scribe as only printer codes in the range 0 to 31 can be embedded in Merlin Scribe text.

It is an excellent program though the manual could do with more examples and explanation for the novice user. Even so, to avoid looking up the codes in your printer manual and to be able to print user defined characters this ROM is worth buying.

C.W. Martin

● *Since this review was written Watford have announced that a more user friendly version of the manual is shortly to appear. The original manual was only a temporary version.*

BBC MICROCOMPUTER
PRINTER MONITOR
MANUAL



"Makes Printing Chicks Play"

Watford Electronics

I HAVE been looking for a handy way of copying graphics from the screen for some time.

As a teacher, the possibilities of children making a hard copy of their work has always appealed to me.

True, I could always load a screen dump program into the computer beforehand. But that did not give me the flexibility I was looking for.

What I wanted was a simple, and fast, way of telling the computer to send the information on the screen to the printer.

Just as I was pondering further on the

Screen Dump ROM

D.A. Computers

problem, I found an advertisement in this magazine that seemed to fit the bill. It also said that it would magnify the dumped hard copy, too. Needless to say, a cheque went in the post the next day.

After two weeks, a small envelope came winging its way into my classroom.

On opening it I was rather surprised to find another, much smaller, envelope. On opening that, I found a well-wrapped and protected ROM chip.

On the front of the small envelope was a typed label telling me how to get further instructions, once I had fitted the ROM.

After the usual 10 minutes to fit, the ROM was ready to be utilised.

*H.G. was the command I was told to use, utilising the *HELP facility. This means that you would need a series 1.0, or later, operating system.

The instructions were, in turn, made into a hard copy by entering Ctrl B before using the *H.G. facility.

The resulting instructions, delivered in a novel and effective way, were on the whole quite clear.

The information section tells of the effects you can accomplish using the ROM.

It will enable you to print upright or sideways – the latter I have found useful for larger images – in single, double, triple, or quadruple size.

It will also select a portion of the screen, if desired.

BBC modes 0, 1, 2, 3, 4 or 5 can be used. Any printer mode can be used for Epson, Seikosha, CTI, NEC and others.

The syntax section, was not, at first, as clear as it could have been for someone, like myself, who is used to Wordwise.

I was confronted with the following syntax:

***GDUMP pc sc st mg bg xl yb xr yt**

I admit I was told to follow the command *GDUMP with up to nine numeric arguments. But I nevertheless continued my *W. habit of putting numbers after what I thought to be command letters.

After three attempts it struck me quite by chance to try just the numbers.

I think, for the slow learners like me, it would have been simpler to have used the term WHERE. That is, where the letters stand for a series of up to nine

spaced numeric arguments.

The numeric arguments themselves are very easy to use:

pc stands for PRINTERCODE. Examples are given, for the different printers, and your attention is drawn to the Escape * codes in the printer handbook. Default setting is 0. For example, Epson MX, and others, use 0 or 1 (where 1=Double density).

sc stands for SCALE. The range is 1 to 4. The value 3 is not strictly triple size, but rather a useful 1.5 x horizontal with a 2 x vertical scale.

Value 4, in conjunction with st, gives 3 x horizontal and 4 x vertical scale. Default setting is 2 x scale (H. & V.).

st stands for STYLE. 0 = upright or 1 = sideways print. You have to add 4 to these for four-colour shading, or 8 for eight-colour shading.

mg stands for MARGIN. This shifts the hardcopy print to the right where mg = normal character spaces.

bg stands for BACKGROUND. This sets the GCOL number of the background, normally 0 or 128. All other colours will print, and changing the bg will alter the allocation of shadings to colours.

WINDOW xl yb xr yt. These stand for the four sets of graphics co-ordinates, as in VDU24, enabling you to pick a specific part of the screen to be copied.

Default setting – all four zero (or omitted) treated as the whole screen.

There then follows a series of notes, among which is advice on halting the printing. Escape held down will not leave the printer hung-up as the Break key will do.

The combination of screen mode 0 and scale = 1 can cause loss of thin lines. Upright printing, in dual density, will cure this.

Styles 4 and 8 will not work with scales 1 and 2, presumably because the colour-shading dumps need a scale * density high enough to give full resolution.

Window size should be limited for the Seikosha (<479 dots per line) and the NEC (<639 dots per line).

On the whole, I have already found this ROM to be dependable and very useful and on present performance and versatility, this Screen Dump has proven to be well worth the £15 quoted at present.

For those of you wishing to use the results of the ROM, all the screen dumps in this issue were done using it.

John Rivers

ROM STANDS YOUR TEXT ON ITS END

If I gave your son a BBC Micro for Christmas, it was the best present you've ever had!



Because you could run your business for little more than the cost of his games!

**STOCK CONTROL, INVOICING
SALES & PURCHASE LEDGERS**
all at an incredible **£30*** each—on disk*—and we guarantee them to work.



DATA MANAGER—on disk*

Software For All's first-class range of Business Programs will do all your paperwork chores efficiently and cost-effectively—because they have been thoroughly tested before release so

you can be sure they won't let you down. And at prices realistic enough to interest any businessman, however small. Briefly, here's what they'll do:

▷ **Stock Control:** Gives full control of your stock lines. Issues, Receipts, Adjustments, Stock Updates, Stock Valuation, Reorder Reports and full Stock Listings.

▷ **Invoicing:** Integrates with stock—calls up items automatically. Rapid, simple to use, high-quality Invoice print. Many useful features including Credit Notes.

▷ **Sales Ledger:** Full updating of clients' accounts. Aged Debtors' Analysis—aids credit control. Statements, VAT Summary, Ledger Cards, Daybooks, Invoices, Credit Notes, Receipts and Journals.

▷ **Purchase Ledger:** Full updating of suppliers' accounts. Creditors' Schedule, Remittance Advices, VAT Summary, Daybooks, Invoices, Credit Notes, Payments and Journals.

**SOFTWARE
FOR ALL**

BUSINESS PROGRAMS

Software For All Business Programs are widely available at reputable BBC and Acorn Dealers throughout the country. But if you have any difficulty obtaining them, please contact us direct and we'll be pleased to advise you.

* £30 on disk, £20 on cassette. Prices exclusive of VAT.

SOFTWARE FOR ALL

72 North Street, Romford RM1 1DA
Telephone 0708 60725 Dealer enquiries welcome.



National Micro

DATA STORAGE

A data cassette recorder that perfectly matches the BBC Micro.

£34.74



Fully compatible with the BBC Micro and specifically designed for data saving and loading, the Pye data cassette recorder (with free power pack and BBC lead) is guaranteed to end your data storage and retrieval problems.

The Hobbit

High speed floppy tape system **£135.00**
Zero memory option **£25.00**
(£18 if ordered with the Hobbit)

Our range of high quality drives below are all cased in metal to prevent interference and data loss.

AMS 3" disc drives

AMS-3(S) 100k Single **£195.00**
AMS-3(T) 200k Double **£347.00**

Cumana slimline disc drives

Including integral power supply

Cumana CS100 100k Single
(40 track) **£215.00**
Cumana CD200 200k Dual
(40 track) **£340.00**

Pace slimline disc drives

Pace PSD1 100k Single **£185.00**
Pace PSD2 200k Single **£235.00**
Pace PSD3 400k Single (40/80
track, switchable) **£305.00**
Pace PSD4 400k Single (80 track) **£285.00**
Pace PSD5 200k (40/80 track,
switchable) **£235.00**
Pace PDD1 200k Double (40 track) **£338.00**
Pace PDD2 400k Double (40 track) **£449.00**
Pace PDD3 800k Double (40/80
track, switchable) **£579.00**

FREE

Replica II

This utility, enabling you to transfer your programs from tape to disc, is offered FREE with each disc drive purchased.

Blank data cassettes (box of 10) **£4.35**
Hobbit micro cassettes (box of 6) **£20.00**
Double sided (100k x 2) 3" discs **£4.30**
Single sided, single density BASF discs
(box of 10) **£16.09**
Double sided, double density BASF discs
(box of 10) **£26.04**

DISC UTILITIES

Replica II **£10.43***
The Key **£11.26***

* State 40 or 80 track

FREE

Carriage on all our hardware
(UK customers only).

Upgrade your BBC micro into a complete business machine.

Torch Z80 Disc Pack

Gives a massive 800k of storage and a Z80 second processor enabling you to access a wide range of CP/M compatible software.

Order now and you'll be given more than £1,100 worth of free software: Perfect Writer (word processing), Perfect Speller (spelling checker), Perfect Calc (spreadsheet), Perfect Filer (database), Comanex business management game, and the Torchnet networking system.

£730

NEW!

Z80 second processor for the BBC Micro + Sage 400 integrated accounts package.

Three ledgers for the price of one -
(Nominal, Sales and Purchase)

£375

MONITORS

Microvitec 1451 medium resolution ... **£325.00**
Microvitec 1431 low resolution **£215.00**
Microvitec 1431P colour monitor and
composite video **£249.00**
Kaga 12" amber screen high
resolution **£119.00**
Kaga 12" green screen high
resolution **£109.00**
Zenith green screen **£75.00**
Normende 14" monitor and
portable TV - Standard **£218.00**
- Remote control **£230.00**

Specifically designed for use both as a monitor and a television (not just a modified TV), the Nordmende represents a perfect answer to the over-use of the domestic TV - at a price less than many comparable colour monitors.

The above prices are inclusive of
connecting leads for the BBC Micro.

PRINTERS

We stock a comprehensive range of
printers from all leading suppliers.
Please phone for details.

Personal shoppers can obtain the
products advertised on these pages
from the following retail stores:

Stockport Micro Centre
4/6 Brown St., Stockport,
Greater Manchester.
Tel: 061-480 0539

Wilmslow Micro Centre,
62 Grove Street,
Wilmslow, Cheshire.
Tel: 0625 530891

SOFTWARE

We have over 1,000 titles in stock!
Below is a selection, including our
best sellers and new titles.

Acornsoft

Sphinx Adventure **£8.65***
Philosophers Quest **£8.65***
Kingdom of Hamil **£8.65**
Hopper **£8.65***
Starship Command **£8.65***
Graphs and Charts **£8.65**
Creative Graphics **£8.65**
Shirley Conran's Magic Garden **£8.65***
* Disc versions **£10.00**

Alligata

Dambusters **£6.91**
Eagle Empire **£6.91**
Contract Bridge **£8.65**

A.S.K.

Number Gulper **£8.65**
Children from Space **£8.65**
Cranky **£8.65**

BBC Publications

The Computer Program - Vol 1 **£8.69**
- Vol 2 **£8.69**
White Knight Mark Eleven **£10.00**
Dr Who: the first adventure **£8.69**
Vu Type (Typing Tutor) **£14.00**

B.E.S.

World Wise **£7.80**
Wordhang **£7.80**
Map Rally **£7.80**

Computer Concepts ROMs

Wordwise **£36.00**
Graphics **£28.00**
Grenlin **£28.00**
Disc Doctor **£28.00**
Termi **£28.00**

Digital Fantasia Adventures

Golden Baton **£8.65**
Escape from Pulsar 7 **£8.65**
The Wizard Akrytz **£8.65**
Perseus and Andromeda **£8.65**
Ten Little Indians **£8.65**

Doctor Soft

747 Flight Simulator **£7.78***
* Disc version **£10.39**

Gemini

Database **£17.35***
Spreadsheet Analysis **£17.35***
Graph Plot **£17.35***
Home Accounts **£17.35***
* Disc versions **£20.83**

Good Housekeeping

Mr T Tells the Time **£11.26**
Mr T's Money Box **£11.26**
Mr T's Alphabet Games **£11.26**
Mr T's Number Games **£11.26**
Mr T's Measuring Games **£11.26**
Mr T's Shape Games **£11.26**

Ivan Berg

Theatre Quiz **£11.00**
Crime and Detection Quiz **£11.00**
Science Fiction Quiz **£11.00**

Lothlorien

Johney Reb (1861) **£6.04**

Or use the order form below

March 1984 MICRO USER 137

Make the most of your micro DATA FILE

The all-singing, all-dancing Data File, built on five years experience yet purposely created specifically for the BBC Micro.

Experience has taught us that not only do any two people never need the same in a data file, but even one person wants it to be capable of many things. We think that the Kansas Data File fulfills this need, and will be recognised as the standard.

It's main appeal must be its sheer versatility. You can define not only the length of any field, but the actual number of fields—up to 20! So you can make it an ordinary name and address file, or anything extraordinary that you might wish. And all permanently saved to tape...

The number of files available depends entirely on the length of the file. Up to 1947 with a single field.

Here are the facilities of Data File:

Create File Define any number of fields up to 20. Define length of each field up to 255 characters. Name each field as required. Computer automatically uses maximum memory.

Insert Simply type in pressing Return for next field.

Search Data File has a most unique Search facility, for it will search any defined field throughout the whole file, but not only this, it can be asked to search for the item at the start of the field or in fact anywhere in that field, making it a very powerful facility indeed.

Edit Couldn't be simpler—just use the cursor keys.

Jump A very handy feature, allowing you to jump to any particular file you require.

Sort Not just the normal first field sort, but one which allows you to define the sort field.

Status Not found in normal data files, this is useful for it tells you the file name, when updated, files used, and most important how many files free.

Print A most important facility, allows the printing of the files, as required.

Delete Deletes unwanted files, and at the same time the remaining records will be closed up.

Save Allows you to save the entire file to cassette. This can be loaded at the start when Data File is run.

To facilitate the ease of operation, all the above functions are on the red function keys, so needing just a single key stroke to bring into operation.

£12.50 Vat and post paid

PERSONAL ACCOUNTS

Another exclusive Kansas program, designed for the micro user to keep an accurate check on all accounts.

This program is not limited to personal cash accounts, but can also be used in conjunction with a cheque account or even to keeping a credit card account in order. In fact there is little limit to its use, where the transaction of money is concerned.

As it creates its own files to tape, it can be used for a multitude of purposes, each having its own file and thus being loaded to handle transactions.

It can hold 500 transaction entries!

A great asset of the program is that it can be customised by altering any of the 32 items, with in fact 10 already set aside for this purpose, with the others too being simple to change.

Each entry has its own number, together with amount, date and item, with all details and current balance shown after each entry. This makes it very straightforward to add either payments or deposits to the file.

There is also a list facility, even allowing the scrolling through the entire file.

Facility is also provided for alteration of any entry, with automatic update of the current balance. The balance itself can be altered, which is useful when using as a credit card account, as a monthly payment is made.

There is a clever little routine which allows you to estimate the effect any particular payment may have on your account, so you can see if you can really afford it or not!

A status section lets you see the current balance, file name, when updated, transactions on file and spare entries.

Personal Accounts is very friendly in use, with messages should you do something wrong, such as using the same transaction number twice.

Files can be saved to cassette, and you have the choice of either loading in a saved file or creating a new one, when the program is run.

Use is made of colour, with the obvious showing of deposits or payments.

£12.50 Vat and post paid

**When you buy from Kansas you are buying from the
longest established software publishers in the country**

**The only company that can give a lifetime guarantee
and assured same-day first class post service**

APPROACHABLE—We attend all the major computer exhibitions

Recognised Brand Leader in microcomputer software



Kansas Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield, S44 5XF. Tel. 0246 850357

**New
available now!**

Z80 second processor for BBC Microcomputer with SAGE 400 integrated accounts program **£375**

+ VAT



GCC (Cambridge) Limited
66 High Street, Sawston, Cambridge CB2 4BG
Telephone: Cambridge (0223) 835330

Trade and local authority enquiries welcome.
Prices correct at time of going to press.

KAY-ESS

COMPUTER PRODUCTS

PROFESSIONAL PROGRAMS FOR THE MODEL B

SPACE TRAFFIC CONTROLLER—"NEW"

£6.95

As a space traffic controller you have been stationed at the main robot cargo port of the planet Ore-7. It is your job to get the robot spacecrafts down in one piece. As your confidence increases you can increase the number of crafts allowed within your control area. Warning: not to be played after a hard or hectic day!

SPACE TANK

£6.95

After you SPACE TANK has landed on the planet Orion, a series of alien tanks, surface hoppers, and spacecrafts will attack. How long can you hold out commander? This game makes use of the Beeb's fast scrolling ability. Can be used with either keyboard or joysticks. Top ten table. Pause option.

STAR HAWKS

£6.95

Can you stop the STAR HAWKS before they stop you? Slow work means the generation of more laser firing mutant hawks. Based on the games of Galaxian and Gorf. Can be used with either keyboard or joysticks. Top eight table. Pause option.

HORSES

£6.95

Come on now, don't be shy, choose one of the six horses and let's see what you can do. How many of the fences can you complete at the Orion arena, especially with the clock ticking away? New riders can try one of the more docile horses while others may like to risk one of the more lively beasts! Can be used with either keyboard or joysticks. Top ten table. Pause option.

DESIGN

£5.95

If you like watching your user defined characters run around the screen but are fed up with the time consuming mathematics, then DESIGN is for you! With DESIGN you can draw your characters on an 8x8 grid and let the machine do all the work. DESIGN's features include being able to recall characters for re-editing, displaying VDU 23 commands, and amenable cursor. All characters used in KAY-ESS programs are created using DESIGN.

KAY-ESS programs are now becoming available at local dealers. Due to demand, we are currently re-writing KAY-ESS programs for use on the ELECTRON. Dealer enquiries welcome.

KAY-ESS computer products previously traded under the name of ORION SOFTWARE.

HANGMAN

£5.95

Let words become fun again with our three language, (ENGLISH, FRENCH, ITALIAN), version of the popular game of HANGMAN. There are 3 levels of play for each language. All words can be replaced or removed, and new ones can be added. HANGMAN comes with an instruction program giving full details for parents and teachers. Once running prying eyes cannot access the word lists!

★ CURRENT BEST SELLERS ★

EARLY YEARS 1 and 2

£7.95 EACH or £14.00 FOR BOTH

These two packages are designed to help a young child with some of the simple concepts that they will need in the world. The emphasis is on learning through fun with simple game type tasks to enforce ideas. 'Time tables' are out and Fred the Frog is in! Topics covered include subtraction, addition, recognition, colour, shapes, sizes, sounds/notes, co-ordination, distances, estimates, directions.

EARLY YEARS 1

- A) MICKEY THE MONKEY and his apple tree make subtraction fun.
- B) COLOUR BLOCKS bring sizes and colours into perspective.
- C) MERRY MUSIC turns the keyboard into a musical keyboard.
- D) FUNNY FACES presents a line up, which one is the suspect?
- E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2

- A) THE POND seems very active today.
- B) SPEED is required to keep the cake on the conveyor belt.
- C) DIRECTIONS seem to be needed by everyone in Orion village.
- D) ORDER the blocks.
- E) SID THE SPIDER needs some help to get out of the maze.

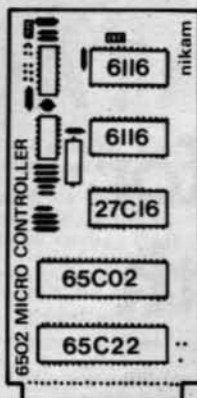
For children between 4-8 years of age.

Cheques/P.O.'s should be made payable to KAY-ESS computer products. All prices are fully inclusive. MAIL ORDER ONLY.

**FREE with all orders is
our 3 level version of
NOUGHTS AND CROSSES!!!**

**KAY-ESS Computer Products,
11 Buttercup Close,
Romleighs Park,
Harold Wood,
Essex RM3 0XF.**

6502 MICROCONTROLLER



- Interfaces to BBC computer with software UART
- 65C02 CMOS microprocessor
- Low power consumption – can be battery powered
- 3 x 2K byte-wide memory sockets
- 1MHz ceramic resonator clock
- 6522 VIA – 2 x 8 bit I/O ports, 2 timers, shift register, 4 control lines
- Autostart feature

Assembled and tested (inc. manual) £69.99
Bare board (P.T.H.) £16.99

TECHNICAL MANUAL Complete documentation – £2.50
(inc. postage, no VAT)

MONITOR EPROM £14.99

Commands: – Memory – Load, Fast Load, Programme – Run, Step (display registers).

Programmes assembled on the BBC are downloaded via the RS423 port.

MOTHER BOARD £18.99 Bare board £4.99

Contains edge connector, reset switch, –5V converter, RS423 level converter, power lead, signal lead and plug.

BBC VIA BOARD £24.99

Adds an extra 6522 VAI (inc. 34 way cable) *N.B. This item is not required for use with the above.*

Mail order only P & P £1.50

Cheques, postal orders payable to:- Nikam Electronics Ltd.,
25 Suffolk Drive, Lacey Green, Wilmslow, Cheshire SK9 4DE
Prices include VAT. Please allow 28 days delivery.



D.A. COMPUTERS LTD.

BBC ACORN COMPUTERS IN LEICESTER

Specialists in hardware and software.
Fully authorised ACORN-BBC Dealer.

Complete after sales service – repairs
and maintenance contracts.

Two of the most useful utilities for the serious BBC User.

SCREEN DUMP ROM

This 8K page ROM will print out any graphics screen (except mode 7) upright or sideways, x1, x2 or x4 scale on a variety of matrix printers including Epson, Shinwa, Star, NEC, Seikosha, KDC, etc. It will also substitute up to eight shades of grey to represent screen colours. Mode 7 text and graphics can be printed on the FX80 or FX100 only (e.g. teletext screens). This Machine Code software will give you the fastest print out possible on your printer. Page ROM software means you have all the RAM available for your own programmes. Full documentation provided. £20.00

MACHINE CODE MONITOR ROM

Provides powerful facilities for monitoring and debugging machine code and BASIC programmes. Includes single step, break points, disassembler, memory scan "window", search for string or byte sequence, memory move, etc. Also provides BASIC program search and list variables. Extensive documentation. £20.00

BBC Model A and B Microcomputers always in stock

PRINTERS

EPSON FX80 Printers at	£399.00
EPSON RX80F/T Printers at	£299.00
SHINWA CP80 Printers at	£279.00
KDC LOGITEC Printers at	£299.00

Many other printers in stock

MONITORS

MICROVITEC 14" COLOUR - ST. RES. at	£241.50
MICROVITEC 14" COLOUR - MED. RES. at	£373.75
MICROVITEC 14" COLOUR-HIGH RES. at	£503.70
TECO 12" GREEN SCREEN (18MHz Bandwidth)	£107.00

Novex and Cabel also in stock

Also a wide range of Books, Software and accessories for the BBC micro.

Pharmacists – call for a demonstration of our high speed label printing system – 2,500 drug names in R.O.M.

All our prices include V.A.T. – but add £5.00 carriage for heavy items (Printers, Monitors etc.)

Please call and visit our showroom at:-

D.A. Computers Ltd,
104, London Rd., Leicester.

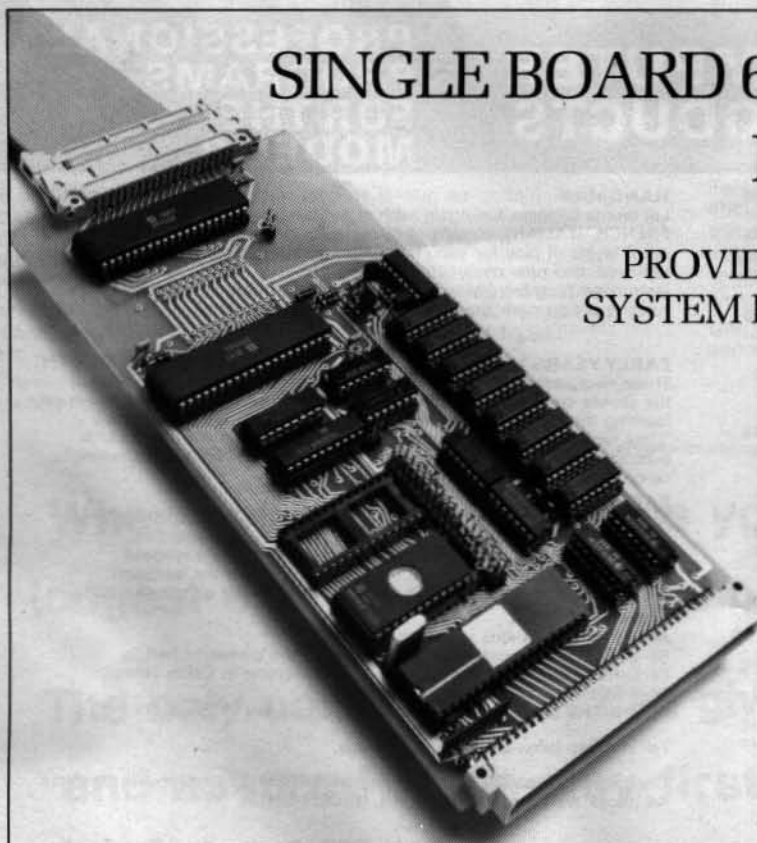
(5 minutes walk from railway station).

We close all day Monday and Sunday otherwise open 9am to 5pm.

Tel. (0533) 549407

SINGLE BOARD 6809 2nd PROCESSOR FOR THE BBC MICRO.

PROVIDES A LOW-COST DEVELOPMENT
SYSTEM FOR INDUSTRIAL APPLICATIONS.



- Sits inside the BBC or plugs into an extension rack
- Enables standard Flex format Discs to run on BBC
- Supports High Level Language Compilers
- Cross Assemblers and Disassemblers for most micros
- Connects directly on to the tube
- 64k DRAM on board
- Two 28 pin byte wide memory sockets
- Acorn Bus compatible DIN 41612 Bus interface
- Also available as a single board controller

For full information contact Phil Taylor at:



11 St Margarets Road
Girton, Cambridge CB3 0LT
(0223) 276791

Cambridge
Microprocessor
Systems Limited

Light pen breakthrough!

Pixel resolution is possible

EVERYONE knows that light pens cannot draw lines as fine as one pixel. Fortunately no-one has told the BBC Micro that!

This month we present a program which used in conjunction with *The Micro User* light pen finally achieves pixel resolution.

The pen itself was described in the October 1983 issue of *The Micro User* and a painting program was given the following month. This simulated the action of a paint brush and produced broad and flowing strokes.

Some artistic endeavours however, are more suited to a clean-cut graphical presentation and so the Draughtsman program has been produced.

The basic light pen is only capable of character resolution – that is, the computer can only sense the position of the pen to the nearest printing character. So in order to achieve pixel resolution we have to resort to some software trickery.

Those of you who have used the painting program will have noticed a small offset between the pen's position and the paint on the screen.

This is naturally compensated for by the brain, and leads to no difficulty in use. However, to coax pixel resolution out of the pen we can use this ability of the brain to good effect.

Consider Figure 1. This shows one character position being pointed at by a light pen. If the pixel point we are interested in is in this square then it is not changed.

However if it is in one of the adjacent squares (shown shaded) it is moved one pixel position towards the pen.

If the point of interest is outside the

immediate area it is moved much more rapidly towards the pen. In practice this means that the point is teased into the correct position, and due to the

By MIKE COOK

cleverness of the human brain is quite naturally achieved.

As we now have a basic method of defining a pixel's position we are able to build the software around this.

Obviously a freehand sketch using the pen would be difficult to control. But as a draughtsman is concerned with

straight lines we can use rubber banding techniques to position our line exactly.

When it is in position the press of a key will fix it permanently on the screen.

As well as rubber-banding single lines, we can also use triangles and rectangles and there is a routine for coping with circles.

When running the program the screen will go white to allow the pen to

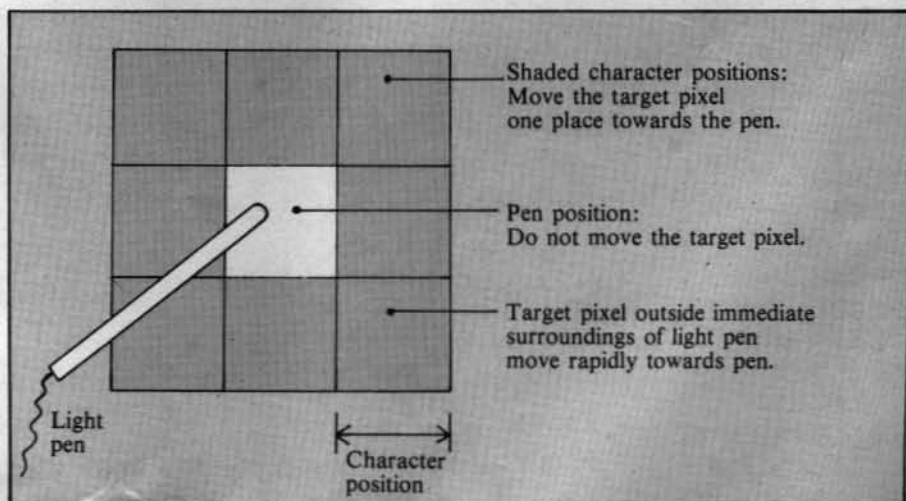


Figure 1: Movement of the target pixel

From Page 141

pick up light. Nothing will happen until one of the modes is entered.

To do this type the letter for the appropriate mode. For example let's draw a straight line by pressing the L key.

The top line of the display should now say LINE. Take up the light pen and you should see a single lit pixel following the pen.

When it is in the correct position for the start of the line press any key. When the pen is moved a line will be drawn from this point to the pen.

This line will move following the pen and behaving like a rubber band on the screen.

When the end position of the line is at the correct place press the Return key and you will be back in the command mode, ready to draw another shape.

If you want to carry on drawing lines press the space bar instead of the Return key and you will stay in the line mode.

If you want the start of the new line to be the same point as the end of the old line then instead of the space bar press J for join.

The triangle mode works in a similar

manner with first a line being rubber-banded and then the full triangle. In this mode the J key will join up the new triangle to the last side of the old one.

When drawing a rectangle the first point will fix one corner and the second point will fix the opposite corner. The join key will join the next rectangle to the last corner of the previous one.

When selecting the polygon mode you will be asked how many sides the polygon is to have. If you require a circle then a large number like 40 should be used.

In this mode the radius is defined by rubber banding but this radius line disappears when the polygon is drawn.

If the join option is used the new polygon will be drawn with the same centre point as the last one.

You can also change the colour of the lines by pressing the C key. This will cycle through the three colours available in Mode 1.

These are set up in line 90 and can be changed to suit your own preferences.

When you have finished your masterpiece the screen can be saved as a file by typing S. You will be asked to provide a file name and the memory

locations that make up the screen will be saved.

For those of you with discs this file will be placed in the directory S for screen dump.

This will reduce the confusion between a screen dump file and a program. If you have tape then the characters S. will be added to the beginning of the file name.

The program also allows you to load a previously dumped file back to the screen to be worked on further. This is done by typing L.

Hints on typing in the program:

Line 80 defines a text window of one line at the top of the screen. This line is best left out until all the typing errors are corrected as any error messages will scroll off the top before you can read them.

There are some variables that start with the LETTER O such as OX% (Old X). Do not confuse these with the number 0.

In line 300 the space between the quote marks and the number is vital. You will get an error message if it is left out.

Unfortunately the error message is not all that helpful. In various lines (such as 150) note there is no space between the quote marks.

Draughtsman listing

5 REM LIGHT PEN DRAUGHTSMAN -

Mike Cook

10 M% = 1

:C% = 3

20 MODE M%

30 PROC_LINT

40 TRIANGLE = FALSE

50 BLUE_IN_THE_FACE = FALSE

60 CLS

70 PROC_INSTRUCTIONS

80 VDU 28,0,0,39,0

90 VDU 19,0,7,0,0,0,19,7,4,0,0
0,19,2,2,0,0,0

100 GCOL 3,C%

110 REPEAT

120 X% = -1

:Y% = -1

130 REPEAT

140 A\$ = INKEY\$ (0)

150 UNTIL A\$ < ">"

160 IF A\$ = "W"

THEN CLG

170 IF A\$ = "S"

THEN PROC_FILE

180 IF A\$ = "G"

THEN PROC_GET

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

190 IF A\$ = "P"

THEN PROC_POLY

200 IF A\$ = "R"

THEN PROC_REC

210 IF A\$ = "C"

THEN PROC_COLCHANGE

220 IF A\$ = "L"

THEN PRINT "LINE";

:PROC_LINE

230 IF A\$ = "T"

THEN PROC_TRIANGLE

240 IF A\$ < ">"

THEN PRINT

250 UNTIL BLUE_IN_THE_FACE

260 DEF PROC_FILE

270 PRINT

280 INPUT "FILE NAME FOR SAVED SCREEN",F\$

290 IF LEN (F\$) < 1

THEN ENDPROC

300 \$CLIX = "SAVE P." + F\$ + " 3000 8000"

310 X% = CLIX MOD 256

:Y% = CLIX DIV 256

320 CALL &FFF7

330 X% = -1

:Y% = -1

340 ENDPROC

350 DEF PROC_GET

360 PRINT

370 INPUT "FILE NAME OF SCREEN",F\$

380 IF LEN (F\$) < 1

THEN ENDPROC

390 \$CLIX = "LOAD P." + F\$

400 X% = CLIX MOD 256

:Y% = CLIX DIV 256

410 CALL &FFF7

420 X% = -1

:Y% = -1

430 ENDPROC

440 DEF PROC_COLCHANGE

The BBC Micro can now give your children a private education.

The BBC Microcomputer now accounts for 80% of the computers being ordered under the current D.O.I. Primary School Scheme.

It's also the computer which a rapidly increasing number of people are choosing for their homes.

One of the reasons for its success is that it makes learning highly entertaining for everybody. From children who are getting to grips with the alphabet, to adults who want a gentle but intensive introduction to the complex world of computing.

Now, there's a substantial new catalogue of educational programs specially for the BBC Microcomputer.

It has been developed by Acornsoft, the software division of Acorn Computers who manufacture the BBC Micro.

Making faces without getting scolded.

With the new Facemaker program, your children can make over a million faces. It's like an identi-kit, allowing them to depict anyone they want. They start by choosing the eyes. Then they can choose the mouth, the ears, the nose, the facial outline and the hairstyle.

And if they really fancy dressing up, they can add earrings and hats.

In doing all this, they learn to read and spell, as well as developing their powers of description.

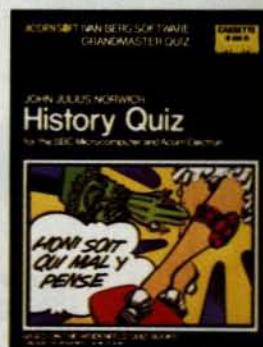
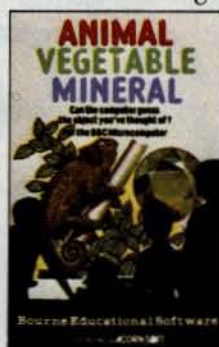
The money program, two games for the price of one.

Mr. T. is an engaging little figment of the microchip who can teach your children all the complexities of our coinage system.

His Money Box program has two games, each of which can be played at different levels.

In Money Match, the challenge is to collect a set of coins, matching them according to shape, size and value.

In Money Box, you can give your child and Mr. T. a helping hand to get all the coins on the screen into the box. (It's always different, because the coins on the screen are based on the small change you have to hand.)



A chance to teach the Micro a thing or two.

With the Animal, Vegetable, Mineral program, the children can get the computer guessing.

They think of an object. The BBC Micro has to decide what it is.

If it doesn't come up with the answer, the children can keep giving it hints.

In doing so, they are encouraged to question the difference between such things as crocodiles and alligators, or whether oil is vegetable or mineral.

The program also encourages them to consult refer-

ence books so that they can ask the computer increasingly tough questions.

Questions on Julius Caesar from J. Julius Norwich.

John Julius Norwich's History Quiz is one of the new BBC Micro Grandmaster quiz series which also covers theatre, crime and detection, music, science fiction and royalty.

On the history front, there are 300 brain-testing questions, covering all aspects of British history from Julius Caesar to Margaret Thatcher.

And to increase the educational value, Mr. Norwich has posed the questions from angles which will give a broader understanding of events.

For the full catalogue, clip the coupon.

There are thirty more new BBC Micro programs in Acornsoft's new catalogue.

For a free copy, complete the coupon, or telephone 0933-79300. Or ask your local BBC Micro dealer.

If you're not yet a BBC Micro owner, you can get full details of the computer at the same time.

To Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please send me the new Acornsoft catalogue "At Home With The BBC Microcomputer."

I would also like details of the BBC Micro ☐ (tick)

Name

Address

Postcode

BU3

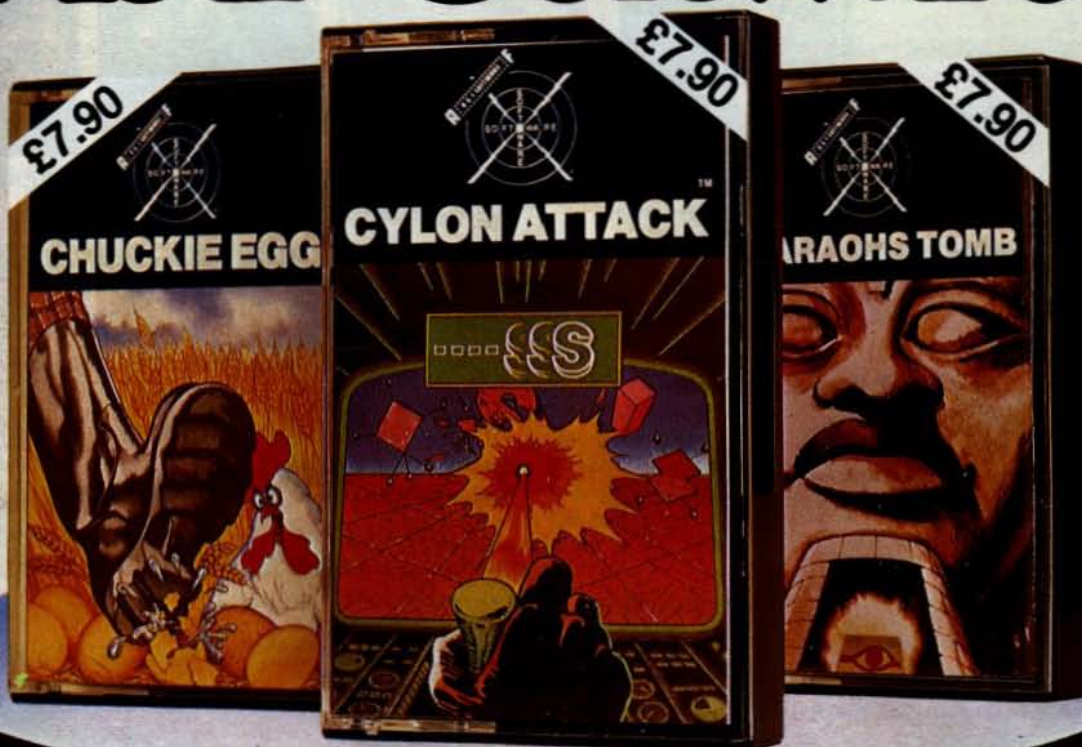


ACORNSOFT

"ATTENTION EARTHLINGS..."



**...Beam us down to
A&F Software."**



	BBC	ELECTRON	DRAGON	SPECTRUM
CHUCKIE EGG	✓	✓	✓	✓
CYLON ATTACK	✓	✓		
JUNGLE FEVER				✓
PHARAOHS TOMB	✓	✓		✓



A&F Software

Available from W.H. Smiths, John Menzies and all leading computer stores.

Unit 8, Canalside Industrial Estate,
Woodbine Street East, Rochdale, Lancs.
OL16 5LB. Tel: 0706 341111

Draughtsman listing

From Page 142

```

450 CX=(CX+1) AND 3
460 IF CX=0
    THEN CX=CX+1
470 COLOUR CX
    :GCOL 3,CX
480 PRINT "NEW COLOUR ";
490 ENDPROC
500 DEF PROC_BAND1
510 REPEAT
520 PROC_FOLLOW
530 A$=INKEY$ (0)
540 UNTIL A$<>" "
550 OX=XZ
    :OY=YZ
560 XT=XZ
    :YT=YZ
570 ENDPROC
580 DEF PROC_BAND2
590 REPEAT
600 PROC_FOLLOW
610 MOVE OX,OY
620 PLOT 13,XT,YT
630 MOVE OX,OY
640 PLOT 13,XT,YT
650 XT=XZ
    :YT=YZ
660 A$=INKEY$ (0)
670 UNTIL A$<>" "
680 MOVE OX,OY
690 PLOT 13,XT,YT
700 ENDPROC
710 DEF PROC_LINE
720 REPEAT
730 IF A$<>"J"
    THEN PROC_BAND1
740 PROC_BAND2
750 GCOL 0,CX
760 MOVE OX,OY
770 DRAW XZ,YZ
780 GCOL 3,CX
790 T1X=OX
    :T1Y=OY
800 OX=XZ
    :OY=YZ
810 UNTIL A$=CHR$ (13) OR TRIANGLE=TRUE
820 ENDPROC
830 DEF PROC_TRIANGLE
840 PRINT "TRIANGLE";
850 REPEAT
860 TRIANGLE=TRUE
870 PROC_LINE
880 TRIANGLE=FALSE
890 REPEAT
900 T2X=XZ
    :T2Y=YZ
910 PROC_TRIBAND(XZ,YZ)
920 REPEAT
930 PROC_FOLLOW
940 PROC_TRIBAND(OX,OY)
950 OX=XZ
    :OY=YZ
960 PROC_TRIBAND(XZ,YZ)
970 A$=INKEY$ (0)
980 UNTIL A$<>" "
990 PROC_TRIBAND(XZ,YZ)
1000 GCOL 0,CX
1010 PROC_TRIBAND(XZ,YZ)
1020 GCOL 3,CX
1030 IF A$<>CHR$ (13)
    THEN PLOT 69,XZ,YZ
1040 T1X=T2X
    :T1Y=T2Y
1050 UNTIL A$<>"J"
1060 UNTIL A$=CHR$ (13)
1070 ENDPROC
1080 DEF PROC_TRIBAND(XZ,YZ)
1090 MOVE T1X,T1Y
1100 PLOT 13,XZ,YZ
1110 MOVE T2X,T2Y
1120 PLOT 13,XZ,YZ
1130 ENDPROC
1140 DEF PROC_REC
1150 PRINT "RECTANGLE";
1160 REPEAT
1170 PROC_BAND1
1180 REPEAT
1190 PROC_REC_BAND
1200 REPEAT
1210 PROC_FOLLOW
1220 PROC_REC_BAND
1230 OX=XZ
    :OY=YZ
1240 PROC_REC_BAND
1250 A$=INKEY$ (0)
1260 UNTIL A$<>" "
1270 PROC_REC_BAND
1280 GCOL 0,CX
1290 PROC_REC_BAND
1300 GCOL 3,CX
1310 IF A$<>CHR$ (13)
    THEN PLOT 69,XZ,YZ
1320 XT=XZ
    :YT=YZ
1330 UNTIL A$<>"J"
1340 UNTIL A$=CHR$ (13)
1350 ENDPROC
1360 DEF PROC_REC_BAND
1370 MOVE XT,YT
1380 PLOT 13,XT,OY
1390 PLOT 13,OX,OY
1400 PLOT 13,OX,YT
1410 PLOT 13,XT,YT
1420 ENDPROC
1430 DEF PROC_POLY
1440 INPUT "POLYGON NUMBER OF SIDES"
    ,NZ
1450 PRINT NZ;" SIDED POLYGON";
1460 REPEAT
1470 PROC_BAND1
1480 REPEAT
1490 PROC_BAND2
1500 PROC_DPOLY(XZ,YZ,OX,OY,NZ)
1510 IF A$="J"
    THEN MOVE OX,OY
    :PLOT 13,XZ,YZ
1520 UNTIL A$<>"J"
1530 UNTIL A$=CHR$ (13)
1540 ENDPROC
1550 DEF PROC_DPOLY(X,Y,XT,YT,NZ)
1560 LOCAL C1,S1,P,R,AZ,X1,Y1
1570 GCOL 0,CX
1580 P=2*PI /NZ
1590 NZ=NZ+1
1600 C1=COS (P)
1610 S1=SIN (P)
1620 MOVE X,Y
1630 FOR AZ=1 TO NZ-1
1640 X1=XT+(X-XT)*C1-(Y-YT)*S1
1650 Y1=YT+(X-XT)*S1+(Y-YT)*C1
1660 X=X1
    :Y=Y1
1670 DRAW X,Y
1680 NEXT
1690 GCOL 3,CX
1700 PLOT 69,XZ,YZ
1710 ENDPROC
1720 DEF PROC_FOLLOW
1730 PROC_LPPOINT
1740 XT=PXPOS*32
1750 YT=(32-PYPOS)*32
1760 PLOT 69,XZ,YZ
1770 IF ABS (XT-XZ) >96
    THEN XZ=XZ+((XT-XZ)/2)
    ELSE IF ABS (XT-XZ) > 32
        THEN XZ=XZ+4*SGN (XT-XZ)
1780 IF ABS (YT-YZ) >96
    THEN YZ=YZ+((YT-YZ)/2)
    ELSE IF ABS (YT-YZ) >32
        THEN YZ=YZ+4*SGN (YT-YZ)
1790 PLOT 69,XZ,YZ
1800 ENDPROC
1810 DEF PROC_LINT
1820 DIM TLAB(7),LPC(7),GRABZ 20
    ,CLIX 27
1830 PX=GRABZ
1840 [
1850 LDX #16
1860 LDA #17
1870 STX &FE00
    :LDX &FE01
1880 STA &FE00
    :LDA &FE01
1890 RTS
1900 ]

```


From Page 145

```

1910 RESTORE 1950
1920 FOR A=0 TO 7
1930 READ TLAG(A),LPC(A)
1940 NEXT
1950 DATA 1542,1,1542,2,1543,4,2053
    ,1
1960 DATA 2820,1,2820,2,3076,1,10248
    ,1
1970 ENDPROC
1980 DEF PROC_LPOINT
1990 REPEAT
2000 AX=ADVAL (1) DIV 64
2010 UNTIL AX>100
2020 PROC_LPDS
2030 ENDPROC
2040 DEF PROC_LPDS
2050 *FX19
2060 PVAL=(USR (GRAB%) AND &FFFF)-TLAG
    (M%)
2070 IF PVAL<0
    THEN PVAL=0
2080 LPR=80
2090 IF M%>3

```

```

THEN LPR=40
2100 PYPOS=PVAL DIV LPR
2110 PXPOS=INT ((PVAL MOD LPR)/LPC(M%))
2120 ENDPROC
2130 DEF PROC_INSTRUCTIONS
2140 PRINT
2150 PRINT SPC (9);"LIGHT PEN DRAUGHTS
    MAN"
2160 PRINT SPC (13);"By Mike Cook"
2170 PRINT
2180 PRINT "First select a mode by
    typing a letter:~"
2190 PRINT
2200 PRINT "L - Draw a LINE"
2210 PRINT "T - Draw a TRIANGLE"
2220 PRINT "R - Draw a RECTANGLE"
2230 PRINT "P - Draw a POLYGON or
    CIRCLE"
2240 PRINT
2250 PRINT "Then move the dot with
    the light pen."
2260 PRINT
2270 PRINT "Press RETURN at the end
    of each stage"
2280 PRINT "or to stay in the mode

```

```

    press SPACE."
2290 PRINT "Alternatively pressing
    J as the last key";
2300 PRINT "will Join up the next
    shape."
2310 PRINT
2320 PRINT
2330 PRINT "Other commands are:~"
2340 PRINT
2350 PRINT "C - To change the COLOUR"
2360 PRINT "W - To Wipe the screen
    clean"
2370 PRINT "S - To SAVE the screen
    as a file"
2380 PRINT "G - To GET a screen previo
    usly saved"
2390 PRINT
2400 PRINT "Press any key to begin."
2410 A$=GET$
2420 CLS
2430 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 169.

AUSTRALIA IN 6 MINUTES?

Geography teacher Bob Phillips' program on the school's BBC Micro needed a map of Australia divided into states, with the names of states and cities appearing when requested by the student. Using an RD Digital TRACER, Bob prepared this usually laborious task in just six minutes. "It's so simple," he said "... it's traced directly from an atlas, scaled up or down as needed, and so I have a very accurate presentation, with plenty of colour and

movement to maintain the kids' interest."

The RD Digital TRACER is specially suited for educational use. From geography to biology, from chemistry to arts and crafts. It's features include:-

- Immediate reproduction from original drawings (up to A3) to display file
- Adding geometrical shapes, text, colour and shading
- Automatic re-trace, or animation (on BBC)
- Save your drawings on cassette or print-out, or merge with your own programs
- Uses all the BBC's colour graphics modes, including Teletext
- No previous computer knowledge needed.

Available direct, from Spectrum stores or Griffin & George



For
BBC Micro B
£69.95
For ZX Spectrum
£55.50
Prices include P & P
and VAT (UK only)

Supplied
with full, easy to understand
instructions and advanced software.

The RD Digital TRACER

...SIMPLY CREATIVE

Please _____ Tracer(s) for BBC Micro at **£69.95** each, total **£** _____
 send _____ Tracer(s) for ZX Spectrum at **£55.50** each, total **£** _____

Name _____

Address _____

Cheque, payable to RD Laboratories Ltd, for **£** _____ enclosed.

Send to: Dept MU2 RD Laboratories Ltd 20 Court Road Estate Cwmbran Gwent NP44 3AS. Allow 28 days for delivery.

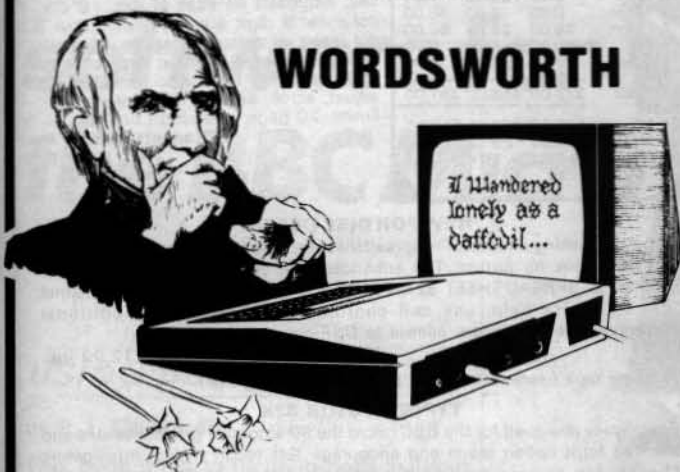
For further details write (SAE please) or phone

RD Laboratories

20 Court Road Estate Cwmbran Gwent NP44 3AS
 Tel (06333) 74333 Telex 437240

WHICH **BBC WORD-PROCESSOR**
DOES **MAIL-MERGING**, GIVES YOU
AS MANY COPIES AS YOU WANT,
PRINTS **50 - PAGE DOCUMENTS**,
DOES WORD-COUNTING AND EVEN
ADDS UP FIGURES?

WORDSWORTH



WORDSWORTH

does all these things as well as the usual jobs.
No need to buy separate mail-list programs or printer drivers, no need to pay three times the price for word-processors with fewer features! Compatible with Acorn or Watford DFS, Microwriter Keyboard and almost any printer.

'I have been responsible for the selection of several generations of applications software. I can recognise a well-written package and am very impressed with the performance and "user friendliness" of Wordsworth.'

— P. J. STANLEY

'I find it very useful, not only for its features, but also for the helpful prompts, which enable a beginner like me to keep on track.'

— R. BLEWETT

And now.... PROPORTIONAL PRINTING

**WITH STRAIGHT MARGINS, USING
WORDSWORTH WITH UTILITY 1 AND
AN EPSON FX-80 PRINTER.
PROPORTIONAL PRINTING WITH THE
JUKI DAISYWHEEL READY SOON.**

Available from selected branches of W.H. Smith and good retailers, or from
IAN COPESTAKE, Dept. W17
23, Connaught crescent,
Brookwood, WOKING, Surrey GU24 0AN.
Telephone/Mailbox: 048674755

PRICES including MANUALS, VAT, P & P

WORDSWORTH DISC	40-TRACK	80-TRACK
including rigid A5 wallet	£22.71	£23.86
UTILITY 1 DISC		
without wallet	£8.62	£9.78
with wallet	£11.78	£12.94

★ £2.00 OFF IF YOU BUY BOTH AT ONCE ★

WORDSWORTH TAPE	£17.54	MANUAL ONLY	£2.88
DISC WALLET	£3.16	PACK OF 10 \$SSDDISCS	£19.55
'SEE 10' DISC LIBRARY BOX		£3.16	
(the best design we have seen)			

PROGRAMS AVAILABLE SOON ON 3-INCH DISC
EUROPE:- Prices as above
OUTSIDE EUROPE:- Please add £3.00 per item

Animate your Basic programs with Arcade-speed Sprites

SIMONSOFT SPRITES VERSION 2

@ £12.95 each BBC Model B

A devastating new sprites package! FASTEST EVER screen movement seen in Basic programs brought to your own character designs. All routines called from Basic, no knowledge of machine code is required.

Look at these features:

- 1 Pixel-by-pixel movement, resulting in a fluid-smooth motion of sprites. Yet even when moving one pixel at a time, a sprite may cross the screen 40 times in 13.5 seconds.
- 2 Up to 48 SPRITES on screen at any one time.
- 3 All 16 logical colours available in sprite design.
- 4 12 different base sprites each with up to 3 clones. Each sprite has independent screen images and movement control.
- 5 Two images for every sprite to allow ultra-smooth motion (left, righthand pixels). Can be defined separately for animation e.g. jumping frogs, running men, etc.
- 6 COLLISION DETECTOR with hit flags set to the numbers of the sprites overlapping.
- 7 SUPERSPRITES of up to 24 × 24 pixels. Can be moved as a single sprite, uses just two coordinate integers.
- 8 Incredible ENLARGEMENT FACILITY allowing up to ×5 magnification of any sprites. Let your invaders loom out of the screen in 3-D effects!
- 9 User-defined PRESET FLIGHT PATHS each with 8 directions of 255 steps.
- 10 Both EOR plotting and TRANSFER plotting available. EOR plotting allows sprites to cross background without disrupting it, transfer plotting cuts through background. Transfer plotting + background storage available for no disruption and no colour change as sprites cross background.
- 11 'Old' sprites deleted automatically, screen boundaries crossed automatically.
- 12 TWENTY different sprite routines: optimise on speed and memory space by choosing the routine best suited to your program.
- 13 Routine deposited in RAM, write Basic as normal, then SAVE/LOAD your program and sprites as a whole.
- 14 Two arcade-speed demonstration games (inc. DEVIL SWARM) using sprites.
- 15 Excellent manual accompanies package.
- 16 May be used in programs you wish to market.
- 17 Compatible with DISC/CASSETTE based system. Please specify.

PLEASE compare with other sprite packages
DON'T OPT FOR ANYTHING LESS

SUPERFRUIT (32K) £5.95

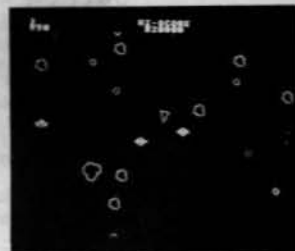
Simply the best. Full colour high resolution graphics. Spinning reels with 'bounce'. Incredible gamble effects, hold, 3 types of gamble, swap reels, two-way nudge, nudge gambles, coin pile that shrinks/grows, great sound effects. Separate instruction program. This implementation is in a class of its own. "You would be fully justified in claiming that it is better than the real thing" — M. Field, Oxford.



Actual screen photograph

ASTROWARS (32K) £6.95

The up-to-date version of asteroid style programs. Your ship is trapped in an asteroid swirl and your only hope for survival is to blast a clear path through the asteroid cloud. Two types of alien saucer make your existence perilous. One homes in on your ship, the other strafes it while dodging your laser bolts. A unique feature allows you to set the speed of the action, the initial screen number, and the frequency of both kamikazi and strafe saucers.



Actual screen photograph

Please order from

**SIMONSOFT, 25 TATHAM ROAD
ABINGDON, OXON OX14 1QB**

For prompt despatch — Dealer and foreign distributor enquiries welcome

SAFETY & SECURITY

WITH THE NEW TIDYBASE MICROCOMPUTER HOUSING

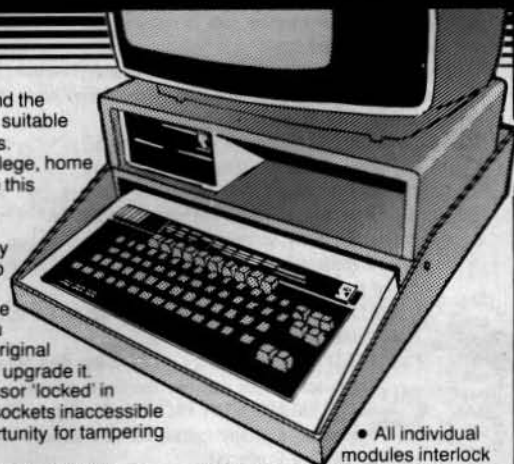
Designed around the BBC model B but suitable for various models.

For School, College, home and business use this compact housing offers special safety and security features. Made up of individual modules—available separately—if you already own the original Tidybase you can upgrade it.

With the processor 'locked' in place; plugs and sockets inaccessible there is little opportunity for tampering or pilfering.

- Optional and unique security bar locks equipment in place.
- 3 or 4 way socket accommodates monitor, processor, drive, printer etc. One external lead only for mains input—no multi-plugging, no adaptors.
- Strong metal construction with safety edges, stoved finished Brown or Cream.

For full details
REMEDIAN INSTRUMENTS LIMITED
3 Over Links Drive, Poole, Dorset BH14 9QU
Tel: Canford Cliffs (0202) 708404



- All individual modules interlock to provide complete housing.
- Alternative housings for various disk drives available.
- Optional trolley for ease of movement or unlock and carry the system.



remedian

CONTEX

Professional Software for the BBC Computer

Command (? for help)

(8998)	a	b	c
1	Car tax	75.00	0.00
2	Insure	0.00	150.00
3	Loan	150.00	150.00
4	Deprec.	100.00	100.00
5	Repairs	0.00	25.00
6	Maint.	0.00	0.00
7	Petrol	36.00	25.00
8	Oil	0.00	5.00
9	Other	12.00	3.00
10	Total	373.00	458.00
11	Mileage	600.00	400.00
12	MPG	30.33	29.12
13	Cost/ml	0.62	1.14

SPREADSHEET 32K

A complete and versatile 'calc' program and tutorial. Models over 1,000 cells using up to 26 columns and 99 rows. Equations, constants, data or text in any cell. Emphasis on ease of use. 10 chr columns; 9 digit accuracy; print; row & col insert or delete; functions; colour; variables; save & restore; copy cell; auto replicate col & row; auto formulae adjust; scroll; search; help; evaluate; limits. 20 page instruction booklet.

Cassette £9.99 inc.

NEW FOR DISC USERS

If you are seeking a top quality spreadsheet for financial or statistical analysis you need look no further. The enhanced disc spreadsheet has all of the facilities of SPREADSHEET 32K PLUS individual field widths and decimal formats, more help, use cell coordinates or headings, additional preprogrammed functions, access to DSF commands and more!

DISC SPREADSHEET £12.99 inc.

(existing tape users return tape and £6.00 for upgrade)

TYPING TUTOR 32K

Specifically designed for the BBC micro the 90 smoothly graded lessons and the free form option teach and encourage fast touch typing. Intelligently checks for errors, monitors progress, times (WPM) and makes recommendations. Audio key feedback, metronomic pacing, clock and revised performance options. Auto keyboard/finder display for every lesson. Add own lessons if required. 12 Page instruction booklet.

Cassette £9.99 inc.

Disc £11.99 inc.

Fast delivery. Discs supplied are 5 1/4" please specify if 40 or 80 track required.

CONTEX COMPUTING (B2)

15 Woodlands Close, Cople, Bedford MK44 3UE.

EPROM PROGRAMMER for 12K ATOM and BBC B

Designed as a low cost practical solution for the serious computer hobbyist. Program supplied on tape. Plugs into Acorn bus connector on Atom and into user port on BBC machine.

NOTE—6522 VIA must be fitted to Atom and BBC machine together with appropriate external connectors.

NEW MODEL—Will program 2716, 2532 & 2732 on 12K Atom (larger ROMs if extra memory available). Will program 2716, 2532 2732 & 2764's on BBC Model A and additionally 27128's on the Model B (or 32K 'A' with 6522 fitted).

MENU DRIVEN—it will:

- 1 Copy from EPROM into memory
- 2 Copy from memory into blank EPROM
- 3 Verify EPROM against memory
- 4 Check for blank EPROM

Software supplied on tape can also be put into EPROM
Supplied in a sloping box complete with connecting cable, instructions, standard 28 pin socket

only £35 + VAT p&p £1

or including a high quality textool 28 pin ZIF socket

ONLY £45 + VAT p&p £1

ROM EXPANSION CARD FOR ATOM

Plugs into utility ROM socket inside case. Allows up to 4 off 4K EPROMs to be software selected. Assembled and tested board.

£13.00 + VAT + 50p p&p

SIDEWAYS ROM EXTENSION RAM/ROM CARD FOR BBC

Allows up to 13 additional ROMs to be fitted OR 16K or RAM + 5 additional ROMs. Provision also for 2 of the sockets to be used to hold 2764's and to simulate a 16K ROM. All address and data lines fully buffered.

RAM allows programs to be downloaded from disc or tape and run as a sideways ROM. Any write signal to the sideways ROM area will appear in the RAM.

Also will allow programs to be developed for subsequent insertion into sideways ROM.

High quality PTH Board, assembled and tested.

£29.50 + £1 p&p

BUTTERFLY BOARD FOR BBC

Fits into one of the sideways ROM sockets and allows a 16K program to reside in two low cost 2764's to simulate a 27128 ROM. Built and tested

£15.00 + VAT + 50p p&p



Orders and further details to:
HCR Electronic Services
The Industrial Unit
Parker Road
Chelmsford
Essex CM2 0ES
Tel: (0245) 350188

Micro/T.V. Adaptor

Do you get fed up with constantly unplugging your T.V. ariel, fitting your micro lead behind your T.V., and then having to change back?

Use this Adaptor and a simple switch beside the T.V. connects or disconnects your micro.

Switch on, change channel and your micro has its V.D.U., switch off, change channel and you have your T.V. Easily fitted in 15 seconds.

£7.99 complete (incl. p&p)

Send cheque/P.O. together with Name, Address, Make & model of micro to: **MR H. ALLEN,**
Milford House,
Bolt House Close, Tavistock.
DEVON. PL19 8LL

The best in books and software for the BBC Micro



USING BBC BASIC

by P.J. Cockerell

This book aims to develop both skills in BBC BASIC and a more intimate knowledge of some of the special features on the BBC Microcomputer. Programs as well as text are presented in an easy and accessible style and the emphasis is very much on developing various techniques and skills by actually using the programs provided.

0471 90242 X 392pp £6.95

A YOUNG PERSON'S GUIDE TO BBC BASIC

by M. Milan

This book is a friendly programming primer which assumes no previous knowledge or experience of computing. It emphasises the advantages of a structured approach to programming, paying particular attention to good programming technique. Helpful hints for overcoming problems and making programming easier are given throughout the book.

085012 393 3 116pp £4.50

Published by the National Computing Centre and marketed by John Wiley and Sons Ltd.

COMPUTING FOR ALL THE FAMILY WITH A BBC COMPUTER

by T. Noble

Following the tremendous success of *The VIC-20 for Children*, Tony Noble has now written a similar book for the popular BBC computer.

The book begins with an introduction to the uses of microcomputers then takes you through about 50 short simple, easy-to-follow steps that take you from turning on the computer to advanced BASIC programming. These have been thoroughly tested in schools with outstanding success.

0905104 587 180pp £5.95

Published by Sigma Technical Press and marketed by John Wiley and Sons Ltd.

MY SECRET FILE

by Phil Nathans

Based on the best-selling book by John Astrop

A personal database for your darkest thoughts.

Do you have secrets you wouldn't even confide to your closest friend? Let alone your family?

At last, you're no longer alone. *My Secret File* turns your personal computer into a personal confidante. And to keep your confidences confidential, it's even password protected — because these days, you can't even trust your micro not to blab.

0946855 404 book/cassette pack £9.95

Published by Mosaic Publishing Ltd. and marketed by John Wiley and Sons Ltd.

THE UNORTHODOX ENGINEERS: The Pen and the Dark

by Keith Campbell

Based on the story by Colin Kapp

Colin Kapp created the classic SF stories about the Unorthodox Engineers — and now you can try to solve the mystery of the indestructible pillar of darkness and the riddle of contra-energy in this mind-bending text adventure game.

By special arrangement with an unspecified alien culture, Mosaic will let you have the story along with the program — so at least you're in with a chance. Please read the story carefully... because we'd like to release our Spring SF bookware blockbuster (Harry Harrison's *Stainless Steel Rat* on micro for the first time!) before you carelessly unleash contra-energy across the universe. Thank you.

0946855 20X book/cassette pack £9.95

Published by Mosaic Publishing Ltd. and marketed by John Wiley and Sons Ltd.

TENSE FRENCH: Know Your Verbs

by Sulis Software

Tense French teaches you how to get those basic French verbs (regular and irregular) right. The little beasts are translated, listed and tested, so that whether you've a gift for languages or not, these common verbs won't bother you again.

0946658 55 2 £9.95

Published by Sulis Software Ltd. and marketed by John Wiley and Sons Ltd.

JUST A MOT: Vocabulary

by Sulis Software

A bi-lingual program for learning 1000 useful and up-to-date French words. There are five vocabulary areas: Travel, Shopping, Food, Drink and Essentials. Work from English into French, or vice versa, with a choice of games or key-in options.

0946658 35 8 £9.95

Published by Sulis Software Ltd. and marketed by John Wiley and Sons Ltd.

COMPUTER BOOK MONTH

The books and software featured in this advertisement plus many other titles will be on display at leading bookshops and computer stores in the UK during March 1984.

For a checklist of titles please write to

Annabella Duckit,

John Wiley & Sons Ltd,

FREEPOST, Baffins Lane,

CHICHESTER, West Sussex

PO19 1YP, England



John Wiley & Sons Limited

Baffins Lane · Chichester

Sussex PO19 1UD · England

CHEMIPLANT

HI-RES GRAPHICS
COLOUR & SOUND



**H & H
SOFTWARE**
PRESENTS 3 NEW TAPES
for the
BBC 32K COMPUTER
to add to their existing range of games
and educational software.

LOONEY LIFT

A new action packed arcade game with hi-res graphics, full colour and sound. Keep your guests jumping, operate the lift and watch out for the luggage. The alternative is the sack!

£7.50

CHEMIPLANT

Another first? A chemical plant simulation. Avoid explosions, spills and other disasters on your way to your first million. Plant manual included. Hi-res graphics.

£7.50

STORY

Electronic storytelling!
First make up some scenes using pictures from the computer bank or use your own drawing skills. Then write your story. Up to 7 screens can be displayed, saved and printed.

£6.50

To get more information about our new and existing software, ask for a catalogue. Please send a s.a.e.

*** Disc versions available; please add £1.50 ***

Please send orders and cheques/PO to:

**H & H Software, Dept M, 53 Holloway,
Runcorn, Cheshire WA7 4TJ. Tel: 09285
65566**

NOW EVERYBODY CAN BE A SWIFT PROGRAMMER!!!

BBC
and
ELECTRON

The new Swift Programmer Pack contains specially printed sheets to help accurately position type and graphics on the screen.

Each Pack contains 100 printed surfaces each of:

TEXT GRID ONE ... For use with Modes 1, 2, 4 & 5

TEXT GRID TWO ... For use with Modes 6 & 7

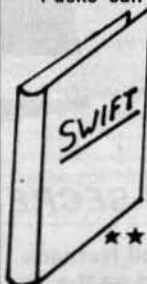
GRAPHICS GRID ... 1280 x 1024 gu in steps of 50

CHARACTER DEFINITION GRID ... Numbered 8 x 8

squares for easy reference

PLUS ... A5 binder to hold pads

If you own a BBC or ELECTRON micro, Swift Programmer Packs can help make your programming easier and faster.



**PACKS AVAILABLE
AT ONLY
£5.95 each**

(+ please add £0.95 p&p)



SWIFT READER

A suite of eight programs designed to help children (age 4+) learn to read.

This package takes children from simple letter recognition, through to the reading of a simple story, incorporating "Variable Text Read Out" speed options.

Swift reader ref. Swift 8

DISC
& CASSETTE
FOR BBC MICRO

SWIFT G.C.E. HISTORY

Three packages, each containing TWO programs, designed to be used as G.C.E. O'Level Study and Revision aids, with text and test facilities.

SWIFT 6 ... Hitler's Germany 1933-1939

Mussolini's Italy 1919-1939

SWIFT 7 ... Lenin's Russia 1917-1924

Stalin's Russia 1924-1939

SWIFT 9 ... USA in the 1920's

Roosevelt's new deal

CASSETTES £9.95 each inc.

DISCS £11.95 each inc.

All programs are for 32k micros

Send cheque/P.O. with details of
Packs/Tapes/Discs required to:

**SWIFT MACHINE SOFTWARE
154 Greenfield Road, Holmfirth
Nr. Huddersfield W. Yorks HD7 1LP
or send for further details**



From Page 66

```

100 FOR TX=0TO NX-1
:PROCGHOST
:NEXT
:UNTIL LIVESX=0
110 RUN
120 DEF PROCGHOST
:PROCMOVE
:COLOUR 3
:IF OGX(TX)=225 COLOUR 13
ELSE IF OGX(TX)=238 COLOUR 0
130 IF TIME <(12-SCREENX)*100
VDU 19,TX+1,8;0;
ELSE VDU 19,TX+1,TX+1;0;
140 IF PEEKX=-1 AX(10,10)=32
:PRINT TAB(10,10);CHR$ 32
150 IF XX=GX(TX)+DGX AND YX=GY(TX)+
DGY AND TIME >(12-SCREENX)*100
PROCDIE
160 PRINT TAB(GX(TX),GY(TX));
CHR$ (OGX(TX));
:AX(GX(TX),GY(TX))=OGX(TX)
:OGX(TX)=AX(GX(TX)+DGX,GY(TX)+
DGY)
:GX(TX)=GX(TX)+DGX
:GY(TX)=GY(TX)+DGY
:COLOUR TX+1
:PRINT TAB(GX(TX),GY(TX));
CHR$ 238
:AX(GX(TX),GY(TX))=238
:ENDPROC
170 DEF PROCMOVE
:DGX=0
:DGY=0
:PROCX
:IF TIME <(12-SCREENX)*100 DGX=-
DGX
:IF DGX+GX(TX)>190R DGX+GX(TX)
)<0 DGX=0
180 PROCPEEK
:IF PEEKX>225 DGX=0
190 PROCY
:IF TIME <(12-SCREENX)*100 DGY=-
DGY
200 PROCPEEK
:IF PEEKX>225 DGY=0
210 ENDPROC
220 DEF PROCX
:DGX=SGN (XX-GX(TX))
:ENDPROC
230 DEF PROCY
:DGY=SGN (YX-GY(TX))
:ENDPROC
240 DEF PROCPEEK
:PEEKX=AX(GX(TX)+DGX,GY(TX)+DG
YX)
:ENDPROC
250 DEF PROCMAN

```

```

:COLOUR 5
:GX=0
:PY=0
:AX=INKEY (0)
:FX15,1
260 IF AX=-1ENDPROC
270 CX=CX+1
:IF CX=238CX=236
280 IF AX=136PX=-1
290 IF AX=137PX=1
300 IF AX=90QX=1
310 IF AX=65QX=-1
320 PRINT TAB(XX,YX);CHR$ 32;
:AX(XX,YX)=32
:IF XX+PX>19 XX=0
:PX=0
ELSE IF XX+PX<0 XX=19
:PX=0
330 LX=AX(XX+PX,YX+QX)
340 IF LX=-1 AX(10,10)=32
:SCX=SCX+10+RND(5)
:SOUND 1,1,100,10
350 IF LX=224 SCX=SCX+1
:EATX=EATX+1
:SOUND 0,2,125,1
360 IF LX=225 SCX=SCX+10
:EATX=EATX+1
:TIME =0
:SOUND 1,2,255,20
370 IF LX>225AND LX<>238 PX=0
:QX=0
380 IF LX=238AND TIME >(12-SCREENX)*1
00 PROCDIE
ELSE IF LX=238AND TIME <(12-SCREE
NX)*100 PROCHECK
:PROCUNCH
390 IF EATX>=212 COLOUR 5
:PRINT TAB(XX+PX,YX+QX);CHR$ (CX)
;
:PROCCOLOURS
:PROCSCREEN
:EATX=0
:PROCEN
:PROCPLACE
:SCREENX=SCREENX+1
:PROCSCREENCOUNT
400 XX=XX+PX
:YX=YX+QX
:PRINT TAB(XX,YX);CHR$ (CX);
:AX(XX,YX)=32
:COLOUR 3
:PRINT TAB(4,0);SCX;
:ENDPROC
410 DATA 8,3,3,3,3,3,3,3,4
420 DATA 2,0,0,0,0,0,0,0,2
430 DATA 2,0,8,9,0,8,3,9,0,2
440 DATA 2,0,2,2,0,2,-1,2,0,2
450 DATA 2,0,10,11,0,10,3,11,0,10
460 DATA 2,0,0,0,0,0,0,0,0,0

```

```

470 DATA 2,0,3,3,0,2,0,3,3,4
480 DATA 2,1,0,0,0,2,0,0,0,2
490 DATA 6,3,3,9,0,6,3,3,0,10
500 DATA 2,-1,-1,2,0,2,0,0,0,0
510 DATA 2,-1,-1,2,0,2,0,8,3,3
520 DATA 10,3,3,11,0,2,0,2,-1,-1
530 DATA 0,0,0,0,0,0,0,2,-1,-1
540 DATA 8,3,3,9,0,2,0,10,3,3
550 DATA 2,-1,-1,2,0,2,0,0,0,0
560 DATA 2,-1,-1,2,0,2,0,8,3,3
570 DATA 6,3,3,11,0,2,0,10,3,9
580 DATA 2,0,0,0,0,0,0,0,0,2
590 DATA 2,0,8,9,0,3,3,3,0,10
600 DATA 2,0,10,2,0,0,0,0,0,0
610 DATA 2,1,0,2,0,2,0,8,3,3
620 DATA 6,3,0,2,0,2,0,10,9,-1
630 DATA 2,0,0,0,0,2,0,0,2,-1
640 DATA 2,0,3,3,3,5,3,0,10,3
650 DATA 2,0,0,0,0,0,0,0,0,0
660 DATA 10,3,3,3,3,3,3,3,3,3
670 DEF PROCSCREEN
:FOR T=0TO 15
:VDU 19,T,0;0;
:NEXT
:CLS
:RESTORE
:FOR Y=1TO 26
:FOR X=0TO 9
:COLOUR 4
:READ A
:IF A=-1 AX(X,Y)=32
:AX(19-X,Y)=32
:GOTO 740
680 IF A=0 COLOUR 3
:PRINT TAB(X,Y);CHR$ 224
:AX(X,Y)=224
:PRINT TAB(19-X,Y);CHR$ 224
:AX(19-X,Y)=224
:COLOUR 4
:GOTO 740
690 IF A=1 COLOUR 13
:AX(X,Y)=225
:PRINT TAB(X,Y);CHR$ 225
:GOTO 730
700 COLOUR 4
:PRINT TAB(X,Y);CHR$ (224+A);
:AX(X,Y)=224+A
:IF A>=6 A=A+1

```


From Page 151

```

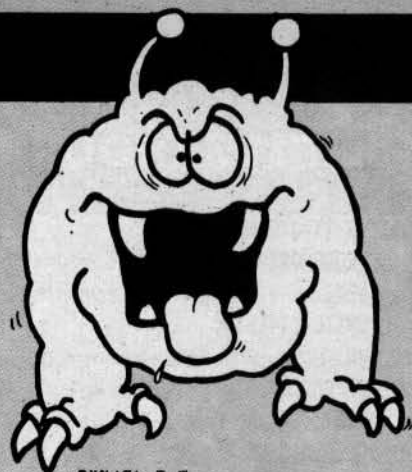
710 COLOUR 4
: C=0
: IF A=8 A=9
: C=1
ELSE IF A=10 C=1
: A=8
720 IF A=10AND C=0 A=11
ELSE IF A=12AND C=0 A=10
730 PRINT TAB(19-X,Y);CHR$(224+A)
: A$(19-X,Y)=224+A
740 NEXT
: NEXT
: A$(10,10)=32
: PRINT TAB(10,10);CHR$ 32
: VDU 20,19,8,1;0;19,9,2;0;
: COLOUR 8
: PRINT TAB(0,0);"IUP ";TAB(9
,0);"HIGH ";
: COLOUR 3
: PRINT ;H%
: ENDPROC
750 PRINT TAB(19-X,Y);CHR$(224+A)
760 DEF PROCCHARS
: VDU 23,225,0,0,24,60,60,24
,0,0,23,226,24,24,24,24,24
,24,24,23,227,0,0,0,255,255
,0,0,0,23,228,0,0,0,255,255
,24,24,24,23,229,24,24,24,255
,255,0,0,0,23,243,16,40,116
,116,116,254,24,0,23,244,0,16
,8,8,8,8,0,0
770 VDU 23,245,12,30,30,12,48,120
,120,48,23,246,0,2,0,0,16,0
,0,0,23,247,128,96,64,32,0,0
,0,0,23,248,111,172,237,185
,63,28,8,56,23,249,15,72,8,0
,0,0,8,56,23,250,0,128,128,128
,0,0,0,56,23,252,0,0,86,32,74
,36,72,16
780 VDU 23,230,24,24,24,31,31,24
,24,24,23,231,24,24,24,248,248
,24,24,24,23,233,0,0,0,248,248
,24,24,24,23,232,0,0,0,31,31
,24,24,24,23,242,56,40,56,16
,16,48,16,48,23,238,24,189,90
,90,255,129,66,36,23,251,0,126
,255,255,255,126,124,56
790 VDU 23,255,0,0,0,0,0,0,23
,254,145,82,0,195,0,36,65,129
800 VDU 23,234,24,24,24,31,31,0
,0,0,23,235,24,24,24,248,248
,0,0,0,23,224,0,0,0,16,0,0,0
,0,23,236,90,60,90,255,129,129
,66,60,23,237,90,60,90,255,129
,126,126,0,23,240,0,108,234
,254,254,254,124,56,23,241,24
,16,16,0,0,0,0,0

```

```

: ENDPROC
810 DEF PROCINIT
: X%=10
: Y%=20
: QX=0
: PX=0
: LX=32
: CX=236
: EATX=1
: SCX=0
: NGX=2
: LIVESX=3
820 A$(0)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 5+CHR$ 240+CHR$ 8+CHR$ 18+
CHR$ 0+CHR$ 9+CHR$ 241+CHR$ 4
: A$(1)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 3+CHR$ 242+CHR$ 4
: A$(2)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 3+CHR$ 243+CHR$ 8+CHR$ 18+
CHR$ 0+CHR$ 7+CHR$ 244+CHR$ 4
830 A$(3)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 8+CHR$ 245+CHR$ 8+CHR$ 18+
CHR$ 0+CHR$ 3+CHR$ 246+CHR$ 8+
CHR$ 18+CHR$ 0+CHR$ 9+CHR$ 247+
CHR$ 4
840 A$(4)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 6+CHR$ 248+CHR$ 8+CHR$ 18+
CHR$ 0+CHR$ 4+CHR$ 249+CHR$ 8+
CHR$ 18+CHR$ 0+CHR$ 3+CHR$ 250+
CHR$ 4
: A$(5)=CHR$ 5+CHR$ 18+CHR$ 0+
CHR$ 8+CHR$ 251+CHR$ 8+CHR$ 18+
CHR$ 0+CHR$ 3+CHR$ 252+CHR$ 8+
CHR$ 18+CHR$ 0+CHR$ 9+CHR$ 241+
CHR$ 4
850 FOR T=0TO NGX-1
: GX(T)=7+T
: GY(T)=15
: OG(T)=224
: NEXT
: SCREENX=1
: A$(X,Y)=32
: COLOUR 5
: PRINT TAB(X,Y);CHR$ (CX);
: ENDPROC
860 DEF PROCIDIE
: COLOUR 13
: PRINT TAB(X,Y);CHR$ 254
: FOR G=255TO 0STEP -10
: SOUND 1,-15,6,1
: NEXT
: LIVESX=LIVESX-1
: FOR T=0TO NGX-1
: COLOUR 3
: IF OG(T)<>224 COLOUR 13
870 IF LIVESX=0 PROCIDIE
880 PRINT TAB(GX(T),GY(T));
CHR$ (OG(T));
: A$(GX(T),GY(T))=OG(T)

```



```

: GX(T)=7+T
: GY(T)=15
: OG(T)=A$(GX(T),GY(T))
: A$(GX(T),GY(T))=238
: COLOUR T+1
: PRINT TAB(GX(T),GY(T));
CHR$ 238;
: NEXT
890 A$(X,Y)=32
: PRINT TAB(X,Y);CHR$ 32
: CX=236
: COLOUR 5
: X%=10
: Y%=20
: PX=0
: QX=0
: PRINT TAB(X,Y);CHR$ (CX);
: DGX=0
: DGY=0
: PROCMEN
: ENDPROC
900 DEF PROCMUNCH
: SOUND 3,3,100,10
: SCX=SCX+50
: COLOUR 3
: IF OG(T)<>224 COLOUR 13
910 IF OG(T)=225 SOUND 3,3,100
,10
: TIME =0
920 PRINT TAB(GX(T),GY(T));
CHR$ (OG(T));
: A$(GX(T),GY(T))=OG(T)
: GX(T)=7+TX
: GY(T)=15
: OG(T)=A$(GX(T),GY(T))
: A$(GX(T),GY(T))=238
: COLOUR TX+1
: PRINT TAB(GX(T),GY(T));
CHR$ 238;
: ENDPROC
930 DEF PROCHECK
: JX=-1
: TX=0
: REPEAT
: JX=JX+1
: IF GX(JX)=X+PXAND GY(JX)=Y+Q
% TX=JX
940 UNTIL JX=NGX

```


**BBC
MICRO
USER**



Deathwatch

and 24 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 1.

**BBC
MICRO
USER**

KING KONG



and 22 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 2.

**BBC
MICRO
USER**

AIR STRIKE!



and 33 other
programs listed in the
pages of BBC Micro User
Vol. 1, No. 3

**THE
MICRO
USER**

SPACE PILOT

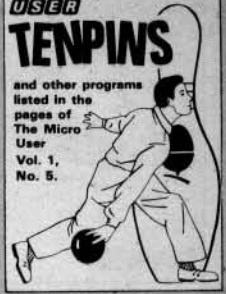
and other programs listed
in the pages of
BBC Micro User
Vol. 1, No. 4.



**THE
MICRO
USER**

TENPINS

and other programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 5.



March Issue

DEATHWATCH, a superb arcade game **BINGO**, clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** function keys in machine code. **0.1 COLOUR** and **GRAPHICS ROUTINES**: create a kaleidoscope of screen designs.

April Issue

KING KONG, rescue girls from the Empire State Building before killing Kong. **NIM**, a structural game of strategy. **TOKENS**, unravel the Basic ROM; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler.

May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; **ANAGRAMS**, the word game. **CHARACTER**, generate vertical and inverted text. **TELETEXT**, animation in Mode 7. **BEEB**, two joystick exercises.

June Issue

SPACE PILOT, lost in space you must fight off repeated attacks from alien life forms. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **COLOURFUL CHARACTERS PLUS** other listings from the June issue.

July Issue

TENPIN, a simulation of Tenpin Bowling; **SPACEPODS**, beat the alien hordes; **CUP**, Exciting 3D graphics techniques **TEST** and **STEADY**, programs to accompany the Beeb Body Building Course. **BREAKFIX**, Don't let Break destroy your precious variables!

**THE
MICRO
USER**

FRUITIES



and other
programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 6

**THE
MICRO
USER**

Robin and Marian



and other
programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 7

**THE
MICRO
USER**

FISHIN'



and other programs
listed in the pages
of The Micro User
Vol. 1, No. 8

Micro User programs now on disc as well as on cassette!

Since we started our highly successful cassette service to readers we have been inundated with requests to supply each month's programs on disc.

Now it's happened!

We've even incorporated an automatic menu downloader. Just boot up the disc, make your choice from the menu, and away you go!

And all for £5.75 a disc, including post and packing.

Of course, our very popular cassette tapes of the month's programs are still available. The price for these is unchanged - £3.75 a cassette, including post and packing.

ORDER FORM ON PAGE 169

August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **ANIMATION**, a suite of programs that really bring your screen alive; **CASDISC**, the machine code downloader for your disc system; **MODE 7** colour routines.

September Issue

ROBIN & MARIAN, rescue Maid Marian from the Sheriff of Nottingham. **GALACTIC INVADERS**, an exciting arcade game. **DFS BENCHMARKS**, 14 DFS test programs. **ANIMATION**, new techniques. **TERMINAL**, connect a BBC Micro to a mainframe.

October Issue

FISHING, a compulsive day's angling. **JOYKEY**, convert programs to joystick. **PENTEST** and **BELLINGER**, for Micro User light pens. **CONTOURS**, an educational program. **LINK** BBC Micros to each other. **PLUS** all the listings from the first Electron User.

**THE
MICRO
USER**

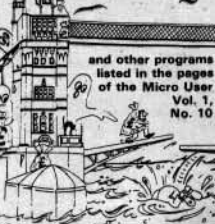
Goblins and Blackjack



and other
programs
listed in the
pages of
The Micro User
Vol. 1, No. 9

**THE
MICRO
USER**

Tower Bridge



and other programs
listed in the pages
of the Micro User
Vol. 1,
No. 10

**THE
MICRO
USER**

Barrel Battle

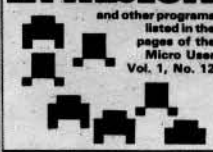
and other programs
listed in the pages
of the Micro User
Vol. 1, No. 11



**THE
MICRO
USER**

ALIEN INVASION

and other programs
listed in the
pages of
the Micro User
Vol. 1, No. 12



**THE
MICRO
USER**

MAZE-MUNCH

and other
programs
listed in the
pages of
The Micro User
Vol. 2,
No. 1.



November Issue

GOBLINS, an enchanted journey. **BLACKJACK**, the casino favourite. **CHARGE** and **PENDULUM**, Body Building Course part 9. **SIDEWAYS**: programs in ROMs. **PENDRAW**, a light pen sketching program. **PLUS** all the programs from the second Electron User.

December Issue

TOWER, rescue London's treasure **SANTA**, help Father Christmas deliver his presents. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **PLUS** all the listings from the third issue of Electron User.

January Issue

BARRELS, an all-action arcade game. **NOTEPLAY**, an entertaining musical utility. **DUMP1** and **DUMP2**, multitone screen dumps. All the programs from our **SOUND**, **BEGINNERS'** and **GRAPHICS** articles **PLUS** 12 programs from the fourth Electron User.

February Issue

INVASION, the classic arcade game. **FROGS**, fun for all the family. **ENGVGEN**, a logic game. **BALANCE**, a number learning program. **KEY**, single key entry for the BBC Micro **PLUS** nine other programs from The Micro User.

March Issue

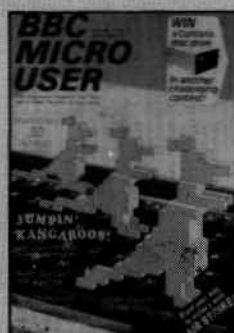
MAZEMUNCH, blockbusting arcade action. **BIRTHDAY**, family fun for our anniversary. **DERRICK**, number fun for infants. **PIXELPEN**, high resolution for lightpens. **LOADTAPE**, a recovery utility. **PLUS** 18 other programs from the pages of Micro User.



March issue
 Beginners: guide to the keyboard. Build your own games paddle. Word processor review. Guide to text colours and graphics. BBC operating system, Part 1. How to avoid cassette loading problems. Deathwatch listing. Upgrade Model A to B at half the shop price. Shapes program. Bingo listing. Sorting routines. Test for function keys in machine code routines. Colour monitors, Part 1.



April issue
 Beginners: simple programming. Impressive graphics with Teletext Mode 7. Common copying errors revealed. How to draw multi-coloured lines. King Kong listing. BBC Operating System, Part 2. Colour monitor review, Part 2. Upgrade Model A to B, Part 2. Finding the ROM's action addresses. Binary code and how to use it. Disc formatter listing. Plus 8-page pullout for Basic programmers.



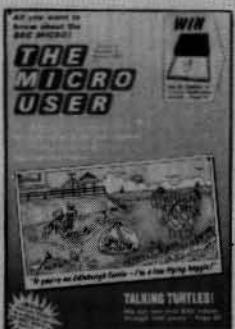
May issue
 Beginners: string variables. Pelmanism listing. Mode 7 animation, Part 2. Interfacing in the laboratory. How to generate vertical or even inverse text. Graphics course: triangles and rectangles. Build yourself a joystick. The Osbyte routine: full investigation. Air Strike listing. Anagrams listing. Structured programming, Part 1. How to make full use of the BBC's editing function.



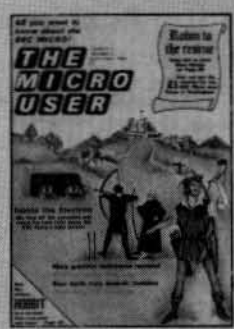
June issue
 Beginners: Use of the INPUT statement. Editing course: LIST and LISTO. Structured programming, Part 2. Solve cassette problems. Build your own graphics digitiser. Hidden *FX calls. Guide to indirection operators. Single key memory display program. Space Pilot listing. Graphics course: text and graphics windows. Nomsim listing. Bring user defined characters to life. Speed chip review.



July issue
 Beginners: loops. Ten Pins listing. Editing course: the PRINT statement. Graphics course: creating sunburst effects. Structured programming, Part 3. How to use the user port to maximum effect. Space Pods listing. Wordwise review. Epson FX80 printer review. The BBC Micro as a sophisticated design tool. Hexadecimal highlights. How to edit with impunity. and fix that break key.



August issue
 Beginners: more help on loops. BBC Micro User's Manchester show reviewed. Animation, Part 1. BBC Buggy and Edinburgh Turtle reviewed. Techniques for switching from tape to disc. Structured programming, Part 4. Inside King Kong: case study of the popular game. Fruities listing. A guide to logical operators. Machine code routines to give Mode 7 colour. Build your own dual cassette system.



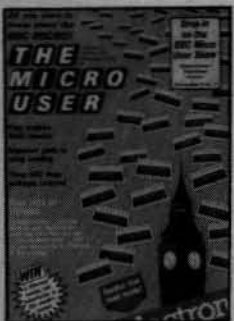
September issue
 Animation Part 2. Editing course: use of TAB. Turn your BBC Micro into a graphics terminal. Galactic Invaders listing. Structured programming, Part 5. Two new DFS and APTL. Eprom blower reviewed. Control the outside world safely with your BBC Micro. Robin and Marian listing. Workshop: variable storage explained. Beebcalc investigated. Inside the Electron: Acorn's latest micro reviewed.



October issue
 Graphics: How to draw circles. Fishing. Structure, the last of the series. Format: We update the program. Make a light pen with Body Building Part 8. Editing: Print fields. The Hobbit reviewed. Workshop: Add joysticks to your games. Link Up: Join two BBC Micros. For... NEXT loops in Beginners' Part 7. Contour plotting program. Basic code, a computer communications language.



November issue
 Beginners: guide to character codes. Light Pen, more useful software. Forth ROM reviewed. Blackjack, a compulsive simulation of the card game. Putting Basic programs into sideways ROMs. Goblins, a fun packed enchanted journey. Body Building Part 9, projects for the Physics lab. The SOUND command explained, Part 1. Games design: improve your programs.



December issue
 Tower Bridge - ghostly encounters in the nation's capital. Paged Graphics: 6845 animation techniques. Character Definer an indispensable utility. Smartmouth reviewed. Sound explained, part 2. Body Building, a sound-to-pattern converter. Beginners, working with strings. Slow Down, alters pace of your programs. Graphics: User defined characters. Santa's Saucer and Christmas Card.



January issue
 Barrel Battle - an all action arcade game. Graphics, an easy to follow introduction to multiplane images. Noteplay, an entertaining musical utility. Body Building: add a DFS to your micro. Printing. Pixels, a multitone screen dump for Epson printers. Sound advice, flushing sound queues. Beginners, the use of TAB. Adventures, our regular column begins. Bits and Bytes investigates binary operations.



February issue
 Alien Invasion - Mode 7 action in this arcade blockbuster. Frogs'n'Dogs, a delightful game for all the family. Number Balance - simple sums for children. Body Building, a real time clock. Sound Shaper, an easy-to-use envelope generator. Single Key Entry, save wear and tear on your fingers. DIY ROM board, full constructional details. Gallery, an intriguing logic game. Sound Advice, synchronising channels.

Make sure your MICRO USER collection is complete!
Back numbers are still available at £1.25 (incl. p&p)
ORDER FORM ON PAGE 169

Mazemunch listing

From Page 152

```

:IF 0G%(TX)>32 EATX=EATX+1
950 ENDPROC
960 DEF PROCMEN
:COLOUR 5
:IF LIVESX>0 PRINT TAB(9,13);
STRING$(LIVESX-1,CHR$ 236);"
";
970 ENDPROC
980 DEF PROCREPLACE
:FOR T=0TO NGX-1
:GX(T)=7+T
:GY(T)=15
:0G%(T)=A$(GX(T),GY(T))
:A$(GX(T),GY(T))=238
:COLOUR T+1
:PRINT TAB(GX(T),GY(T));
CHR$ 238;
:NEXT
:DGX=0
:DGY=0
:X=10
:Y=20
:P=0
:Q=0
:COLOUR 5
:PRINT TAB(X,Y);CHR$ (C%);
:A$(X,Y)=32
:ENDPROC
990 DEF PROCSCREENCOUNT
:IF SCREENX<=20 FOR H=0TO SCREENX
-1
:MOVE H#64,156
:PRINT A$(H MOD 6);
:NEXT
:ENDPROC
ELSE MOVE 0,156
:PRINT A$((SCREENX-1) MOD 6);
:COLOUR 2
:PRINT TAB(1,27);"=";SCREENX
:ENDPROC
1000 DEF PROCCOLOURS
:FOR F=15TO 1STEP -1
:FOR J=0TO 400
:NEXT
:VDU 19,4,F,0;
:NEXT
:CLS
:ENDPROC
1010 DEF PROCFRUIT
:PRINT TAB(10,10);" ";
:MOVE 640,700
:PRINT A$((SCREENX-1) MOD 6);
:A$(10,10)=-1
:ENDPROC
1020 DEF PROCDEED
:COLOUR 3
:PRINT TAB(5,15);"GAME OVER"
:IF SCX>H2H=SCX
1030 COLOUR 8
:PRINT TAB(0,0);"1UP ";TAB(9
,0);"HIGH ";
:COLOUR 3
:PRINT ;H2
:FOR H=0TO 10000
:NEXT
:RUN
1040 IF ERR =17RUN
ELSE REPORT
:PRINT " at line ";ERL
:FX12,0

```

This listing is included in this month's cassette tape offer. See order form on Page 169.



SUPER TWO

ESCAPE:

Lead your fellow prisoners out of the camp through minefields, past dogs, guards and machine guns to the safety of the woods. But wait! This is only screen one. 4 different screens. 7 levels of play

PROBE:

A space flight simulation, using your limited supply of fuel, avoid the planetary defence screen, then combat gravity and the hazards of the lower atmosphere to bring your craft to a safe landing. 2 screens. 9 levels of play.

Cheque/P.O. To:
WAREX SOFT
21 Honor Av.,
Goldthorn Park,
Wolverhampton,
WV4 5HF.

ONLY **£5.00**

Free
P+P

WAREX WELCOME
writers of original
games or
educational
software
on any
micro

BASIC COMPILER

Available now for the BBC Micro

A high performance compiler at a realistic price. Turns your Basic programs into super fast 6502 machine code. The compiler is very easy to use, and has the following features:

- Accepts over 50 Basic keywords
- Handles 26 integer variables
- Full integer arithmetic

The program is supplied on cassette with full instructions for 32K B.B.C. Micro with 1.2 O.S.

Send cheques/PO's for £14.95 or S.A.E. details to:

PARK SOFTWARE

26 Romilly Park Road, Barry, S.Glam CF6 8RQ.

- Can you write intelligible English?
- Can you create brilliant programs?
- Are you capable of working with a bunch of lunatics?

Yes, you've guessed – we need an editorial assistant at Micro User and Electron User!

Send your application, together with examples of your work to:

The Editor, Micro User,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.



XTEND: EPROM UTILITY WITH OPTIONAL PROTECTION SYSTEM:

£24.95. Extend capabilities of your micro with new commands. Invaluable to serious programmer: *FIND,COUNT,REPLACE: any string combination replaced (Globally or Selectively) with user specified string (any length). *CONDENSE: Intelligently and selectively removes REMs, comments, spaces, compacts lines into multi-statement lines. Removes empty lines. *APPEND: joins code simply. *KEYS: Display and edit function keys. *MEM: memory summary with variables taken into account. *STEP: much enhanced trace. Step through line by line at own pace. Numbers shown discreetly at top. Twin screens to protect graphics. Stop and interrogate variables any time. *LIST: left justification of all statements. *VAR: dump variable contents, FN and PROC locations. *SINGLE generate 'single key' keywords — similar to Electron. *FIX: recovers 'BAD PROGRAM's.

Calls may be prefixed with 'X' to avoid clashes with other ROMs.

PROTECTION SYSTEM (OPTIONAL) £7.95. Name and address (please print clearly) incorporated in XTEND. Displayed on screen on power-up.

DATABASE: £12.95. Make card-filing obsolete. Cassette/disc (32K): *Variable field length. *Fast sort/search any field. *Search and replace. *Specific, between-range, wildcard search. *Amend, delete, replace.

Use as mailing list, school/class/club/business records, directories, inventories, catalogues, teaching resource where data compilation and classification are required.

EEL: £7.95 Fun way to learn number bonds/tables. Guide eel and eat the number family. 20 levels of difficulty, suitable for 6+ year olds. User performance record for teacher/parent.

WORD SQUARE: £7.95 Create word squares for any topic.

G.B. GEOGRAPHY: £7.95 High Res. maps of regions.

EURO-GEOGRAPHY: £7.95 High Res. Test your knowledge of countries and capital cities.

PLOTAPIC: £7.95 Display/presentation program allowing pictures to be created using co-ordinate procedures. Results linked together to form story (Supplied with Nativity). Age range 8+.

GEMINI BUSINESS SOFTWARE: £17.95 HOME ACCOUNTS - MAILIST - STOCK CONTROL - SPREADSHEET - GRAPHLOT - COMMERCIAL ACCOUNTS.

MICRO CASE: £35.00 + £3.00 p&p Strong, foam-lined, lockable. Holds BBC micro, recorder, disc drive, cassettes, cables. Black with aluminium trim.

EPROM BLASTING SERVICE Forget cassettes. Put your favourite program in a chip. Phone for details.

Cheque, Access/Visa (Phone anytime), Official order to:

PRIMASOFT.

FREEPOST, GLOSSOP, DERBYSHIRE SK13 9YB.

Add £3.00 per program for disc version. 50 p&p
Excellent royalties for quality Educational software
DEALER ENQUIRIES WELCOME

Add on for your micro DIGITAL MULTIMETER

Put your BBC Micro to good use in the electronic workshop/laboratory with this easy to construct Multimeter add-on. Simply plugs into the User and Analogue Ports to allow resistance, capacitance and voltage measurements to be displayed and read from the screen.

Measures: resistance up to 10 megohms (5 ranges)

capacitance up to 10 microfarads (5 ranges)

voltage up to 100V dc (3 ranges)

Software available.

Although tailored for use with the BBC Micro model B, the hardware may be used with other computers equipped with an I/O and analogue ports.



**EVERYDAY
ELECTRONICS
and computer PROJECTS**

March 1984 on sale 17 Feb

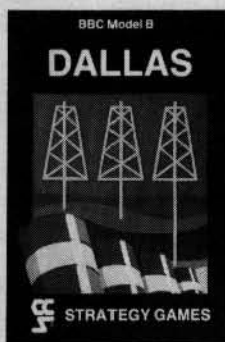
90p

PLANE SAILING



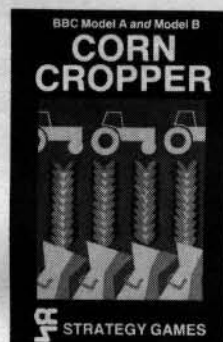
Airline

Hijacks, strikes, crashes and spiralling fuel costs must all be overcome if you are to succeed at this game. A wing and a prayer will not be enough to turn your £3 million to £30 million in the time allowed, but your financial wizardry will enable you to take over British Airways, or will it?



Dallas

Can you amass enough petro dollars to take over the Euing empire. Cut throat business and an eye for the main chance may get you there but you'll need nerves of steel to overcome the oil king of Dallas.



Corn Cropper

Limited cash and droughts are two of the problems facing the farmer. Planting, fertilizing and harvesting must all be done economically if you are to reap the rewards offered in Corn Cropper. You choose the method that will bring you success.



BUSINESS STRATEGY GAMES – £6.95

Selected titles available from Greens, Boots, Rumbelows and all good computer shops or Cases Computer Simulations Ltd., 14 Langton Way, London SE3 7TL.

GET ON THE RIGHT TRACK WITH MICRO POWER



NORTHWOOD HOUSE

Micro Power are an official service and information centre, and we are major suppliers to Government and educational establishments. We stock the complete range of Acornsoft and Program Power software as well as a wide range B.B.C. Micro and general computing books. Our expert staff are always on hand to provide advice and assistance in the relaxed atmosphere of our showroom.

COMPUTERS

BBC Model B	399.00
Acorn Electron	199.00
(phone for availability)	

MONITORS

Philips TP200	89.95
Kaga Green Screen 12"	123.05
Ferguson TX Monitor/TV	316.25
Microvitec 14" Colour (Plastic Case)	286.35
Microvitec 14" Colour (Metal Case)	247.25
Plinth for above	5.75

PRINTERS

Epson FX80	453.85
Epson RX80 F/T	366.85
Mannesmann Tally Spirit 80	
plus 1000 sheet plus cable	299.99
Epson MX80 111 F/T	401.35
Smith Corona TP-1	401.35
MCP 40	129.95
Juki	458.88

DISK DRIVES

Pace 40 track 100K	212.75
Pace 40 track double sided 200K	270.25
Pace 40/80 track double sided 200/400K	350.75
Pace 40 track double drive 200K	388.70
Pace 40 track double sided double drive 400K	516.35
Mitsubishi 40/80 track double sided double drive 400/800K	650.00
Torch Z80 Disk Pack 80 track double sided double drive (including Perfect Soft)	839.50

FOUR FREE PROGRAM POWER CASSETTES WITH EVERY MODEL B

ACCESSORIES

Datex/Lloytron cassette recorders (inc. leads)	29.90
Acorn BBC cassette recorders (inc. leads)	33.90
Memorex S/S S/D Disks (Box of 10)	20.00
Scotch D/S D/D Disks (Box of 10)	32.50
Disk storage cases	17.95
Vinyl dust covers for computers, disk drives, monitors and printers	4.50
Sureshot self centering arcade joystick	18.22
Sureshot self centering double joysticks	34.44
Acorn joysticks	13.00
Nuway Master Plug	9.95
System Sac	19.95
Computer labels (2000 off)	23.00
Printer paper (2000 sheets)	18.40
370mm wide paper (FX100 compatible 2000 sheets)	23.00
Printer cables (parallel or serial)	15.50
Stack light pen	28.75
Speech synthesiser plus cartridge socket (Free 1.2 if required)	55.00
Acorn Disk interface (Free 1.2 ROM if req.)	97.00
Pace disk interface kit	95.00
1.2 ROM upgrade	11.50
Econet (Free 1.2 ROM if req.)	70.00
Teletext adaptor (Free 1.2 ROM if req.)	225.00
View wordprocessor (Free 1.2 ROM if req.)	59.00
Wordwise wordprocessor	45.42
Beebcalc spreadsheet	39.25
Disc Doctor	33.35
Auto Prommers Eprom Programmer	138.00
Tutor Mate shelves	10.50

ALL PRICES INCLUSIVE OF V.A.T.

We provide free fitting for all firmware.

ALL ROADS LEAD TO MICRO POWER!

MICRO POWER



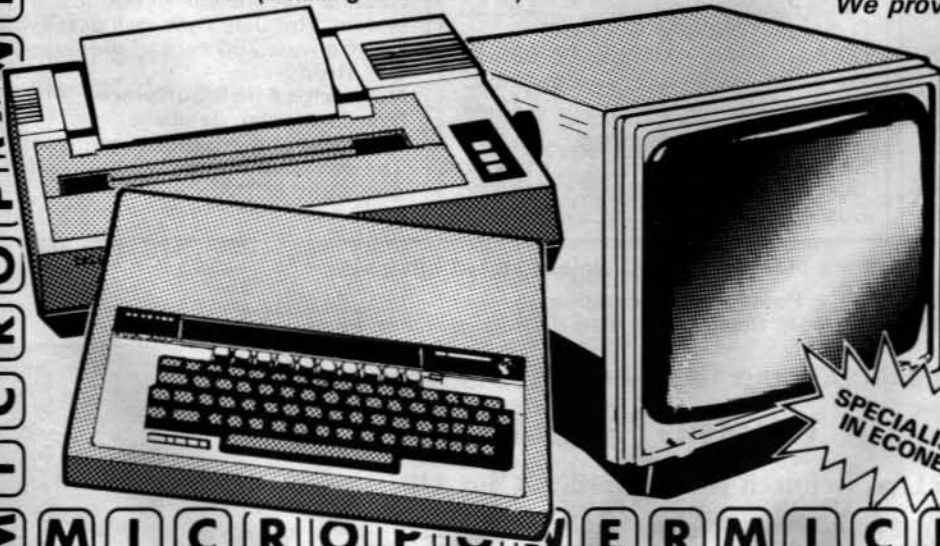
Showroom:
Northwood House
North Street
Leeds LS7 2AA
Tel: (0532) 458800

Mail Order:
8/8a Regent Street
Leeds LS7 4PE
Tel: (0532) 683186/
696343

Send an SAE for our complete listing of hardware, software and books.

CARRIAGE FREE for BBC, printers, monitors and disk drives. Carriage £5 for Electron. Books and software only 55p per order.

SPECIALISTS IN ECONET





SIR BBC ROM EXPANSION BOARD MODEL 2



THE ROM BOARD FOR THE BBC MICRO – NOW WITH RAM!

NEW IMPROVED FACILITIES!

- ★ 12 extra ROM sockets complement those already provided by the micro to allow up to 256K ROM space.
- ★ Four of these sockets can support either ROM or Static RAM (up to 16K maximum RAM).
- ★ The Model 2 board allows switching between multiples of 2K, 4K, 8K or 16K ROM/RAM.
- ★ Fully buffered design.

NOW EVEN EASIER TO FIT!

- ★ NO soldering, plug-in design.
- ★ Fits easily inside BBC case.
- ★ Plugs into CPU socket via short flexible connector.
- ★ Improved plug design allows the Model 2 board to connect securely to any type of BBC CPU socket with no harm to micro or board.
- ★ Board is held in place by sturdy supports.
- ★ Full instructions provided.

SIR BBC ROM EXPANSION BOARD MODEL 2: PRICE £40.00 + VAT

We also stock a complete range of BBC Micro peripherals and software, many at unbeatable prices! The following are just a small sample:

BBC MICROCOMPUTER

BBC Model B£399.00
BBC Model BD£469.00

MONITORS

Sanyo B/G£85.00
Microvitec RGB£229.00

PRINTERS

Dot Matrix:
Epson FX-80£399.00
Epson RX-80£275.00
RX-80 F/T£289.00
Shinwa CP-80£263.35
Daisywheel:
Juki 6100£399.00

SOFTWARE

We have over 200 titles currently in stock including ROM based programs such as:

View£59.80
HCCS Pascal£59.50
Computer Concepts' Graphics
ROM£39.95
Wordwise£39.95
Disc Doctor£29.95

DISC DRIVES

Single 100K£199.00
Dual 100K£349.00
Dual 400K£669.00

BUSINESS SYSTEMS

Torch Z80 Disc Pack:

This powerful and sophisticated unit interfaces with the BBC Micro to create a comprehensive business system. The Disc Pack includes; Twin 400K drives; Z80 second processor; 64K RAM;

Now with FREE Software

(Wordprocessor, database, spreadsheet & management game). The complete system is available for only £839.50!!

All our prices are inclusive of VAT unless stated otherwise.

Postage & Packaging:

Please add £1 P&P (small items: ROM Boards, etc.); £10 P&P (large items: Printers, Monitors, etc.).

ACCESS/BARCLAYCARD TELEPHONE ORDERS WELCOME.

SIR COMPUTERS LTD.

91 Whitchurch Road, Cardiff, CF4 3JP.
Telephone: (0222) 621813



From Page 73

tion should make the rest of the game clear.

PROCEDURES

PROCInstructions [1300] prints out the instructions for the game in Mode 7.
PROCinit [1460] sets up the constants for the game, dimensions the arrays, defines characters and logical colours and sets the initial numbers of gusts (*number%*).

PROCsetup [200] sets the scene for each new "sheet". It calculates the number of walls needed (*W%*), clears *out* and *lit*, puts the candle and flame on the screen and calls procedures to place the walls and gusts.

PROCplacewalls [1070] randomly places walls on the screen. A REPEAT ... UNTIL loop ensures that no wall is placed on top of another by using *FNtest*.

PROCplacegusts [370] randomly places the required number of gusts on the screen using *FNposition* to make sure there isn't another gust too close and *FNtest* to avoid walls.

PROCMOVEgusts [300] uses a loop to call *PROCmovegust* the required

number of times.

PROCmovegust [520] "intelligently" moves the gusts towards the flame by using the sign of the difference between the *x* coordinates, and that of the difference between the *y* coordinates to decide the directions horizontally and vertically the gust should move. It then picks one of these at random, occasionally allowing both — to give the dreaded diagonal movement. No movement is allowed if you run into the wall or the candle's wick (*FNtest* takes care of the rest of the candle!). Also, if a gust hits the flame, *out* is set.

PROCmoveflame [680] flushes the keyboard buffer, then quickly checks to see if any movement keys are pressed, and if the move is legal. If you're slow you miss your go. The procedure beeps, then checks to see if any gust has landed on the flame — if so *out* is set.

PROCmusic [860] when you light the candle this plays ... well, it's obvious isn't it?

FNtest [1220] checks to make sure a position doesn't contain a wall (using *OSBYTE 135*) or the bottom bits of the candle. We don't check for the

wick here as we want the flame to be allowed to reach it. Gusts are prevented from blocking it within *PROCmovegust [650]*.

FNposition [990] makes sure that the gusts are not placed too close to each other initially.

Error Check [1580] traps the Escape key. It also prints out details of other errors you may have made.

VARIABLES

<i>w%</i>	Number of walls.
<i>number%</i>	Number of gusts at that flame.
<i>light%</i>	Position of the moving flame.
<i>flame%</i>	The position of the wick, used for checking a win.
<i>w%()</i>	Holds the positions of walls.
<i>gust%()</i>	Holds positions of gusts.
<i>out</i>	Logical variable set if a gust "lands" on the flame.
<i>lit</i>	Logical variable set if flame reaches the wick at <i>flame%</i> .
<i>candle\$, wall\$, flame\$</i>	Strings containing the user defined character shapes plus any necessary colour changes and cursor movements.

Birthday listings

```

10 REM (C) MICRO USER 1984
20 REM Michael Noels
30 ON ERROR GOTO 1600
40 MODE 7
50 PROCInstructions
60 MODE 1
70 PROCinit
80 REPEAT
90 PROCsetup(number%)
100 REPEAT
110 PROCMOVEgusts(number%)
120 IF NOT out
    THEN PROCmoveflame
130 UNTIL out OR lit
140 IF lit
    THEN PROCmusic
    :number%=number%+1
150 IF out
    THEN SOUND 0,-15,5,20
160 UNTIL number%>20
170 CLS
    :PRINT TAB(14,16)"Okay, you win"
180 END
190 REM =====
200 DEF PROCsetup(n%)
210 CLS
220 w%=40+2*n%
    :light%=20
230 out=FALSE
    :lit=FALSE
240 PRINT TAB(20,31)candle$;

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```

250 PRINT TAB(light% MOD 40, light%
    DIV 40)flame$;
260 PROCplacewalls
270 PROCplacegusts(n%)
280 ENDPROC
290 REM =====
300 DEF PROCMOVEgusts(n%)
310 LOCAL loop%
320 FOR loop%=1 TO n%
330 PROCmovegust(loop%)
340 NEXT loop%
350 ENDPROC
360 REM =====
370 DEF PROCplacegusts(n%)
380 COLOUR 2
390 LOCAL temp%,placed%,loop%
400 FOR loop%=1 TO n%
410 placed%=FALSE
420 REPEAT
430 temp%=120+RND(24*40)
440 IF loop%>1 AND FNposition(temp%
    ,loop%) AND FNtest(temp%)

```

```

    THEN placed%=TRUE
450 IF loop%=1
    THEN placed%=TRUE
460 UNTIL placed%
470 gust%(loop%)=temp%
480 PRINT TAB(temp% MOD 40, temp%
    DIV 40)gust$;
490 NEXT loop%
500 ENDPROC
510 REM =====
520 DEF PROCmovegust(loop%)
530 LOCAL x%,y%,lx%,ly%,lx%,ly%,h%,v%
    ,npos%,decide%
540 lx%=light% MOD 40
    : ly%= light% DIV 40
550 x%=gust%(loop%) MOD 40
    : y%=gust%(loop%) DIV 40
560 h%= SGN (lx%-x%)
    :v%= SGN (ly%-y%)
570 IF h%=0
    THEN npos%=v%*40 + gust%(loop%)
580 IF v%=0
    THEN npos%=h% + gust%(loop%)
590 IF h%=0 AND v%=0
    THEN npos%=gust%(loop%)
600 decide%=1-RND(2)
610 IF h%<>0 AND v%<>0 AND decide%
    THEN npos%=v%*40+gust%(loop%)
620 IF h%<>0 AND v%<>0 AND NOT decide%

```


Birthday listings

From Page 159

```

%
THEN npos%=h%+gust%(loop%)
630 IF h%<0 AND v%<0 AND (RND(2*number%+3)=1)
THEN npos%=h%+v%*40+gust%(loop%)
640 IF npos%=light%
THEN out=TRUE
:gust%(loop%)=npos%
650 IF FNtest(npos%) AND npos%<1279
AND npos%<1180
THEN PRINT TAB(x%,y%) " ";
:PRINT TAB(npos% MOD 40, npos%
DIV 40)gust%;
:gust%(loop%)=npos%
660 ENDPROC
670 REM =====
680 DEF PROCmoveflame
690 LOCAL key%,npos%,L%
700 npos%=light%
710 *FX15,1
720 FOR L%=0 TO 10
730 IF INKEY (-66)AND light%>39
THEN npos%=light%-40
740 IF INKEY (-98) AND light%<1239
THEN npos%=light%+40
750 IF INKEY (-104) AND (light%
MOD 40 <0)
THEN npos%=light%-1
760 IF INKEY (-105) AND ((light%+1)
MOD 40<0) AND light%<1278
THEN npos%=light%+1
770 NEXT
780 SOUND &11,-10,50,4
790 IF npos%=flame%
THEN lit=TRUE
800 IF npos%<light% AND FNtest(npos%)
THEN PRINT TAB(light% MOD 40
, light% DIV 40) " ";
:light%=npos%
810 PRINT TAB(light% MOD 40, light%
DIV 40)flame%;
820 FOR L%=1 TO number%
:IF gust%(L%)=light%
THEN out=TRUE
830 NEXT L%
840 ENDPROC
850 REM =====
860 DEF PROCmusic
870 REPEAT
880 READ pitch,duration
890 SOUND 1,-15,50+pitch,3*duration
900 SOUND 1,0,0,0
910 UNTIL pitch=256
920 RESTORE
930 DATA 0,1,0,1,8,2,0,2,20,2,16

```

```

,4
940 DATA 0,1,0,1,8,2,0,2,28,2,20
,3
950 DATA 0,1,0,1,48,2,36,2,20,2
,16,2
960 DATA 8,2,40,1,40,1,36,2,20,2
,28,2,20,3,256,0
970 ENDPROC
980 REM =====
990 DEF FNposition(temp%,loop%)
1000 LOCAL okay%,L%
1010 okay%=TRUE
1020 FOR L%=1 TO loop%-1
1030 IF ABS (gust%(loop%)-temp%)<25
THEN okay%=FALSE
:L%=loop%-1
1040 NEXT L%
1050 =okay%
1060 REM =====
1070 DEF PROCplacewalls
1080 LOCAL loop%
1090 COLOUR 131
1100 w%(1)=120+RND(26*40)
1110 PRINT TAB(w%(1) MOD 40,w%(1)
DIV 40)wall%;
1120 FOR loop%=2 TO w%
1130 REPEAT
1140 temp%=120+RND(26*40)
1150 UNTIL FNtest(temp%)
1160 w%(loop%)=temp%
1170 COLOUR 135
:PRINT TAB(temp% MOD 40, temp%
DIV 40)wall%;
1180 NEXT loop%
1190 COLOUR 128
1200 ENDPROC
1210 REM =====
1220 DEF FNtest(temp%)
1230 LOCAL C%,A%
1240 okay%=TRUE
1250 VDU 31,temp% MOD 40,temp%
DIV 40
1260 A%=135
:COLOUR 135
1270 C%=(USR (&FFF4)AND &FFFF)
DIV &100
1280 COLOUR 128
:=(C%<35) AND temp%<1220
AND temp%<1260
1290 REM =====
1300 DEF PROCinstructions
1310 VDU 23;8202;0;0;0;
1320 PRINT TAB(10,4)CHR$ (141)
CHR$ (132)CHR$ (157)CHR$ (131)
"BIRTHDAY "CHR$ (156)
1330 PRINT TAB(10,5)CHR$ (141)
CHR$ (132)CHR$ (157)CHR$ (131)
"BIRTHDAY "CHR$ (156)
1340 PRINT TAB(4,8)CHR$ (129)"MICRO

```

```

USER'S ANNIVERSARY GAME"
1350 PRINT TAB(4,11)CHR$ (130)"You
must steer the flame from"
1360 PRINT TAB(4,12)CHR$ (130)"the
top of the screen to the"
1370 PRINT TAB(4,13)CHR$ (130)"candle"
s wick, at the bottom."
1380 PRINT TAB(12,15)CHR$ (131)"left
..... >"
1390 PRINT TAB(12,16)CHR$ (131)"right
..... ?"
1400 PRINT TAB(12,17)CHR$ (131)"up
..... A"
1410 PRINT TAB(12,18)CHR$ (131)"down
..... Z"
1420 PRINT TAB(4,22)CHR$ (132)
CHR$ (157)CHR$ (131)"Press space
bar to continue "CHR$ (156)
1430 REPEAT
:UNTIL INKEY (-99)
1440 ENDPROC
1450 REM =====
1460 DEF PROCinit
1470 number%=2
1480 flame%=29*40+20
1490 VDU 19,0,3,0,0,0
:VDU 19,2,4,0,0,0
:VDU 19,3,0,0,0,0
1500 VDU 23;8202;0;0;0;
1510 DIM gust%(20),w%(80)
1520 VDU 23,225,0,0,0,0,16,16,16
,16,23,226,56,56,56,56,56,56
,56,56,23,227,16,56,56,124,124
,56,16,0,23,228,36,60,255,60
,60,255,60,36
1530 wall%=CHR$ (17)+CHR$ (2)+"#"
1540 candle%=CHR$ (17)+CHR$ (2)+
CHR$ (225)+CHR$ (8)+CHR$ (10)+
CHR$ (226)+CHR$ (8)+CHR$ (10)+
CHR$ (226)
1550 flame%=CHR$ (17)+CHR$ (1)+
CHR$ (227)
:gust%=CHR$ (17)+CHR$ (3)+
CHR$ (228)
1560 ENDPROC
1570 REM =====
1580 REM ===== Error Check =====
1590 REM =====
1600 IF ERR =17
THEN RUN
ELSE MODE 6
:VDU 19,0,4,0,0,0
:REPORT
:PRINT " at ";ERL
:END

```

This listing is included in this month's cassette tape offer. See order form on Page 169.

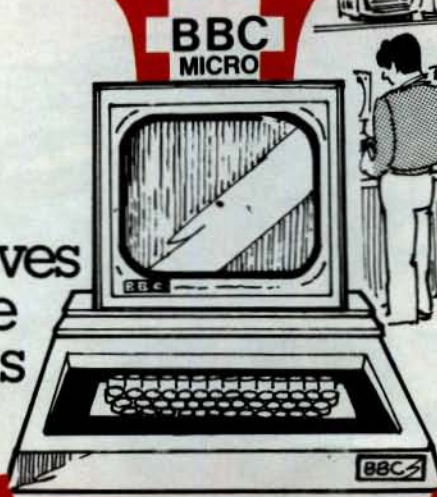
BEST CHOICE BEST SERVICE BEST BUYS

come and see
for
yourselves

choice
selection

friendly
service

- ✦ Electron
- ✦ BBC
- ✦ Sinclair
- ✦ Dragon
- ✦ Vic 64
- ✦ Printers/Disk Drives
- ✦ Plenty of Software
- ✦ Books, games plus help and advice



Special stocks of

BBC computers

ALL AVAILABLE NOW AT THESE FRIENDLY LOCAL CENTRES

SOFTWARE

EASIEST
OF
EASY
TERMS

COMPUTERAMA

112 EAST STREET

SOUTHAMPTON

Tel: 0703 24703

**northern
computers**

Churchfield Road
FRODSHAM Ches.

Tel: 0928 35110

**Barbury
Computers**

89 VICTORIA ROAD

SWINDON

Tel: 0793 611487

**MICRO
PULSE**

MICROPULSE CENTRE
SWIFT & ELMAN SAINSBURY CENTRE
WOOLTON VILLAGE

LIVERPOOL

051 428 3604

**MICRO
PULSE**

**ADVANCED
COMPUTER
PERIPHERALS**

£49.95
+ VAT

£149.90
+ VAT

**MICRO PULSE
3" DISK DRIVE**

**EXTERNAL
ROM Boards for
BBC computers**

Interested in a MICRO PULSE DEALERSHIP?
Ring Steve Rhodes on 0928 35110

KEEP LOOKING FOR THE BEST...

WATCH THIS SPACE!



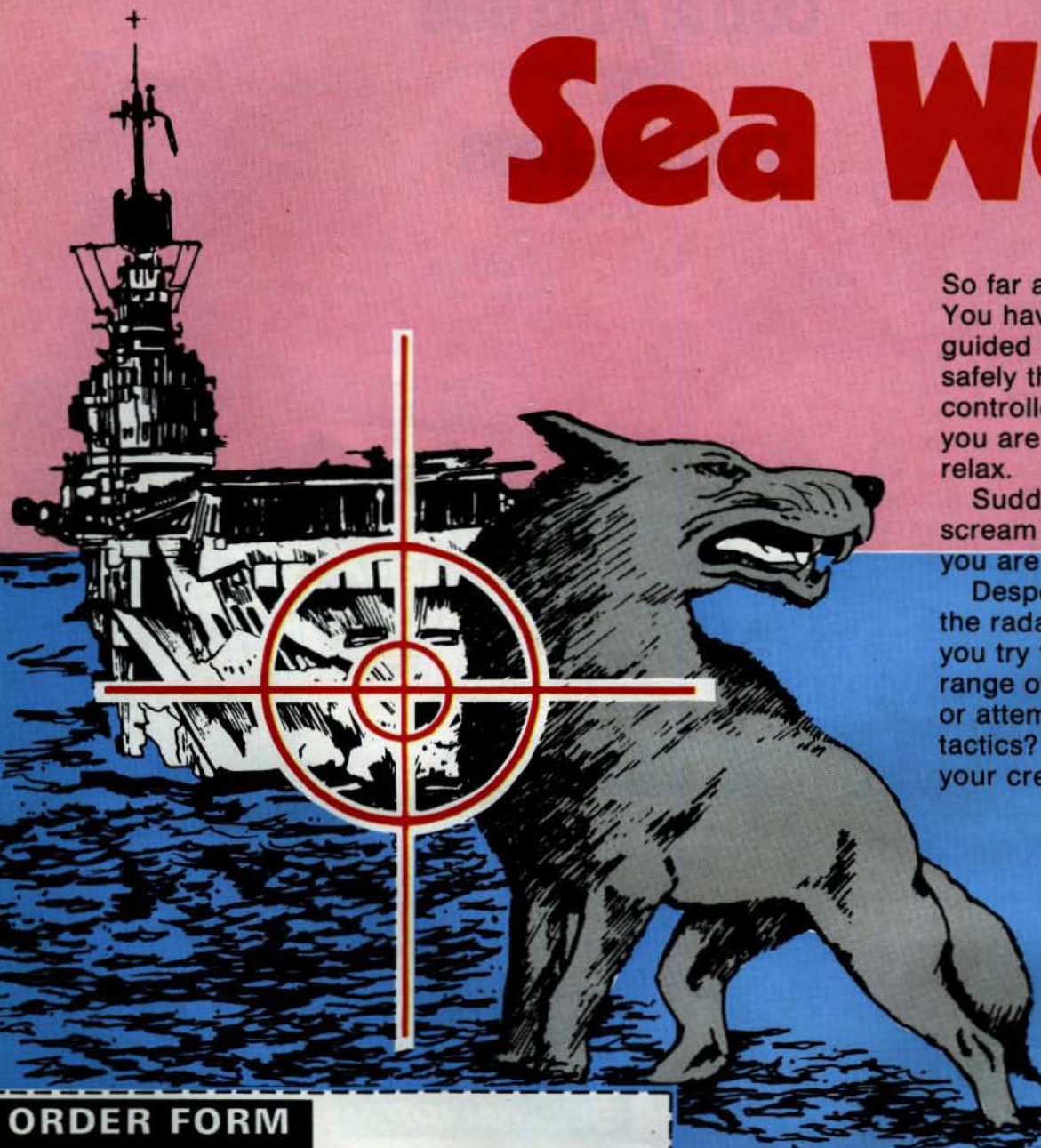
OPTIMA SOFTWARE

Sea Wolf

So far all has gone well. You have successfully guided your submarine safely through enemy controlled waters and you are beginning to relax.

Suddenly alarm bells scream in your ears – you are under attack!

Desperately you scan the radar screen. Should you try to get him within range of your torpedoes, or attempt evasive tactics? Can you lead your crew to safety?



ORDER FORM

Please send me Sea Wolf for the Acorn Electron.

*I enclose remittance of £6.95, plus 50p post & packing.**

Total: £7.45.

* Post free for 2 or more.

Name

Address

.....

.....

.....

.....

☐ I enclose cheque made payable to Optima Software Ltd.

☐ I wish to pay by No.....

☐ Access ☐ Visa Expiry date

Optima Software Ltd., 36 St. Petersgate, Stockport SK1 1HL.

Software. With a touch of brilliance

From Page 57

```

10 MODE 7
   :PROCintro
20 VDU 23,0,8202;0;0;0;
30 PROCdefine
40 REPEAT
50 REPEAT
   :A$=GET$
   :UNTIL INSTR("12",A$)<>0
60 men=3
   :score=0
70 REPEAT
80 MODE 2
   :PROCinit
   :CALL RESET
90 REPEAT
100 PROCspider
110 *FX15,1
120 TX=INKEY (10)
   :IF TX=KEYZ ?%70=-1
   :SZ=-15
130 PROCbase
140 UNTIL BZ<280 OR FNHIT(AZ
   ,BZ)<>0
150 IF BZ<280 PROClend
   ELSE PROCexplode
160 PROCupdate
170 UNTIL men=0
180 MODE 7
   :PROCanother
190 UNTIL FALSE
200 END
210 REM
220 DEF PROCbase
230 SOUND 1,-7,30,1
240 IF INKEY (-104)=-1
   CALL CHRI
250 IF INKEY (-103)=-1
   CALL CHLE
260 IF ?%70=255 SOUND 0
   ,SZ,30,10
   :SZ=SZ+.3
   :CALL CHUP
270 CALL BASE
280 ENDPROC
290 REM
300 DEF PROCspider
310 BZ=BZ-16
   :IF AZ<100 CHZ=RND(12)
320 IF AZ>1000 CHZ=-RND(12)
330 AZ=AZ+CHZ
340 MOVE AZ-32,BZ+32
   :VDU 18,0,0,255,255
   ,255
350 MOVE AZ-64,BZ
   :VDU 255,231,8,18,0

```

```

   ,3,224,225
360 VDU 18,0,0,8,232,255
   :MOVE AZ-32,BZ-32
   :VDU 233,8,18,0,3,229
   ,9,230,8,18,0,0,234
   ,8,8,255
370 MOVE AZ,BZ
   :VDU 18,0,15,227,227
380 MOVE AZ,BZ
   :VDU 18,0,8,226,226
390 MOVE AZ+32,BZ
   :VDU 18,0,1,228
400 MOVE AZ+32,BZ-38
   :VDU 18,0,0,255,8,18
   ,0,7,48+NZ
410 ENDPROC
420 REM
430 DEF FNHIT(aZ,bZ)
440 =POINT(aZ,bZ)+POINT(aZ+12
   B,bZ)+POINT(aZ+32,bZ-64)+
   POINT(aZ+96,bZ-64)+
   POINT(aZ+64,bZ+8)
450 REM
460 DEF PROCdefine
470 GZ=0
   :HZ=0
480 DIM XZ 600,YZ 500
490 PZ=XZ
500 [OPT0
510 .BASE LDX#47
520 .LOOP1 LDA YZ-1,X
   :STA&7228-624,X
530 DEX
   :BPL LOOP1
   :LDX#55
   :.LOOP2
540 LDA YZ+31,X
   :STA&7448-632,X
550 DEX
   :BPL LOOP2
   :LDX#55
   :.LOOP3
560 LDAYZ+71,X
   :STA&7728-632,X
570 DEX
   :BPL LOOP3
580 LDX#60
   :.LOOP6
   :LDA#00
   :STA&7730,X
   :DEX
   :BPL LOOP6
590 LDX#111
600 .LOOP4 LDA YZ+119,X
   :STA&7490-640,X
610 DEX
   :BPL LOOP4

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```

   :LDX#111
   :.LOOP5
620 LDAYZ+215,X
   :STA&7710-640,X
630 DEX
   :BPL LOOP5
   :RTS
640 .RIGHT CLC
   :LDAXZ+6
   :ADC#16
   :STAXZ+6
   :LDAXZ+7
   :ADC#0
   :STAXZ+7
650 CLC
   :LDAXZ+&11
   :ADC#16
   :STAXZ+&11
   :LDAXZ+&12
   :ADC#0
   :STAXZ+&12
660 CLC
   :LDAXZ+&1C
   :ADC#16
   :STAXZ+&1C
   :LDAXZ+&1D
   :ADC#0
   :STAXZ+&1D
670 CLC
   :LDAXZ+&26
   :ADC#16
   :STAXZ+&26
   :LDAXZ+&27
   :ADC#0
   :STAXZ+&27
680 CLC
   :LDAXZ+&3C
   :ADC#16
   :STAXZ+&3C
   :LDAXZ+&3D
   :ADC#0
   :STAXZ+&3D
690 CLC
   :LDAXZ+&31
   :ADC#16
   :STAXZ+&31
   :LDAXZ+&32
   :ADC#0
   :STAXZ+&32
   :RTS
700 .CHRI LDAXZ+&3C
   :CMP#&80
   :LDAXZ+&3D
   :SBC#&75
   :BCC RIGHT
   :RTS
710 .LEFT SEC
   :LDAXZ+&31
   :SBC#16
   :STAXZ+&31
   :LDAXZ+&32
   :SBC#0
   :STAXZ+&32
720 SEC
   :LDAXZ+&26
   :SBC#16
   :STAXZ+&26
   :LDAXZ+&27
   :SBC#0
   :STAXZ+&27
730 SEC
   :LDAXZ+&3C
   :SBC#16
   :STAXZ+&3C
   :LDAXZ+&3D
   :SBC#0
   :STAXZ+&3D
740 SEC
   :LDAXZ+&1C
   :SBC#16
   :STAXZ+&1C
   :LDAXZ+&1D
   :SBC#0
   :STAXZ+&1D
750 SEC
   :LDAXZ+&11
   :SBC#16
   :STAXZ+&11
   :LDAXZ+&12
   :SBC#0
   :STAXZ+&12
760 SEC
   :LDAXZ+&6
   :SBC#16

```


Denary Derrick listing

From Page 163

:STAXZ+&6	:BCC LOOP9	900 FOR PZ=0TO 15 STEP 4	1160 YZ!271=&30202020
:LDAXZ+&7	840 LDA#0	:YZ!PZ=&00000000	:YZ!275=&10101010
:SBC#0	:STA#70	:YZ!(PZ+31)=&00000000	1170 YZ!279=&00000000
:STAXZ+&7	850 .RESET LDAXZ+&3C	:YZ!(PZ+71)=&00000000	:YZ!283=&20000000
:RTS	:CLC	:YZ!(PZ+119)=&00000000	1180 YZ!287=&30101010
770 .CHLE LDAXZ+&3C	:ADC#&A0	:YZ!(PZ+215)=&00000000	:YZ!291=&30101010
:CMP#&90	:STAXZ+&26	:YZ!(PZ+311)=&00000000	1190 YZ!295=&30202030
:LDAXZ+&3D	:LDAXZ+&3D	:NEXT PZ	:YZ!299=&10101030
:SBC#&73	:ADC#2	910 YZ?-1=00	1200 YZ!303=&30000000
:BCS LEFT	:STAXZ+&27	920 YZ!15=&03010101	:YZ!307=&20000020
:RTS	:LDAXZ+&26	:YZ!19=&03030303	1210 VDU 23,224,33,127,227
780 .FIRE SEC	:STAXZ+&11	930 YZ!23=&02000000	,231,127,60,121,144
:LDAXZ+&6	:LDAXZ+&27	:YZ!27=&02020202	:REM HEAD
:SBC#&80	:SEC	940 YZ!47=&01010101	1220 VDU 23,225,132,254,199
:STAXZ+&6	:SBC#5	:YZ!51=&01010101	,231,254,60,158,9
:LDAXZ+&7	:STAXZ+&12	950 YZ!55=&03030303	:REM HEAD
:SBC#2	:LDAXZ+&31	:YZ!59=&03030303	1230 VDU 23,226,0,0,B,8,0
:STAXZ+&7	:CLC	960 YZ!63=&03030303	,0,0,0
790 SEC	:ADC#&A0	:YZ!67=&03030303	:REM EYES
:LDAXZ+&11	:STAXZ+&1C	970 YZ!87=&02030301	1240 VDU 23,227,0,0,16,16
:SBC#&80	860 LDAXZ+&32	:YZ!91=&00000002	,0,0,0,0
:STAXZ+&11	:ADC#2	980 YZ!95=&A1A10303	:REM EYES
:LDAXZ+&12	:STAXZ+&1D	:YZ!99=&5050F0F0	1250 VDU 23,228,0,0,0,0,0
:SBC#2	:LDAXZ+&1C	990 YZ!103=&A0A10303	,60,102,60
:STAXZ+&12	:CLC	:YZ!107=&000000A0	:REM MOUTH
800 SEC	:ADC#8	1000 YZ!111=&02020200	1260 VDU 23,229,18,36,68
:LDAXZ+&26	:STAXZ+&6	:YZ!115=&00000002	,66,65,32,32,16
:SBC#&80	:LDAXZ+&1D	1010 YZ!139=&00000000	:REM LEGS
:STAXZ+&26	:SEC	:YZ!135=&00101000	1270 VDU 23,230,72,36,34
:LDAXZ+&27	:SBC#5	1020 YZ!147=&10101010	,66,130,4,4,8
:SBC#2	:STAXZ+&7	:YZ!143=&30103000	:REM LEGS
:STAXZ+&27	:RTS	1030 YZ!155=&30202030	1280 VDU 23,231,222,128,28
810 SEC	870 .TEAR LDA#&30	:YZ!151=&20203000	,24,128,195,134,11
:LDAXZ+&1C	:STA TEAR+&14	1040 YZ!163=&30000000	1290 VDU 23,232,123,1,56
:SBC#&80	:STA TEAR+&18	:YZ!159=&20103000	,24,1,195,93,146
:STAXZ+&1C	:STA TEAR+&1C	1050 YZ!171=&30100010	1300 VDU 23,233,237,219,187
:LDAXZ+&1D	:STA TEAR+&20	:YZ!167=&20003000	,189,190,223,223,239
:SBC#2	:LDY#60	1060 YZ!179=&30102010	1310 VDU 23,234,183,219,212
:STAXZ+&1D	880 .LOOP10 LDY#00	:YZ!175=&00003000	,189,125,251,251,247
:RTS	:.LOOP11	1070 YZ!187=&30000000	1320 VDU 23,255,255,255,255
820 .CHUP LDAXZ+&7	:LDA&3000,X	:YZ!183=&20103000	,255,255,255,255,255
:CMP#&32	:ASL A	1080 YZ!195=&30000010	1330 ENVELOPE 1,3,10,20,-10
:BCS FIRE	:STA&3000,X	:YZ!191=&20003000	,40,20,60,20,0,-5,-2
830 LDY#&30	:DEX	1090 YZ!203=&30303030	,126,126
:LDA#00	:LDA&3000,X	:YZ!199=&30303000	1340 ENDPROC
:.LOOP9	:LSR A	1100 YZ!211=&00000000	1350 REM
:LDX#0	:STA&3000,X	:YZ!207=&20103000	1360 DEF PROCIntro
:.LOOP8	:DEX	1110 YZ!231=&10000000	1370 FOR Q=1TO 2
:STA&3000,X	:BNE LOOP11	:YZ!235=&00000000	:PRINT TAB(10,Q);
:DEX	:INC LOOP11+&2	1120 YZ!239=&30000010	CHR\$ 141;CHR\$ 131;"DENARY
:BNE LOOP8	:INC LOOP11+&6	:YZ!243=&30101030	DERRICK"
:INY	:INC LOOP11+&A	1130 YZ!247=&30303030	:NEXT
:STY LOOP8+&2	:INC LOOP11+&E	:YZ!251=&10101030	1380 PRINT TAB(9,3);CHR\$ (130)
:CPY#&38	:DEY	1140 YZ!255=&20000000	; "=====
	:BNE LOOP10	1150 YZ!263=&10000000	1390 PRINT TAB(0,4);CHR\$ (134)
	:RTS	:YZ!267=&30101010	
	890 J		

ROMS

SOFTWARE FOR THE BBC MICRO

GREMLIN

This is a machine language monitor ROM designed for use as an aid to development and debugging of machine code programs.

Anyone writing machine code programs will at some time come across a bug in the program. Trying to track down the bug is usually far from easy and this is where GREMLIN will prove invaluable. The ROM contains a full machine code monitor including features such as a disassembler, memory move and search routines etc.

GREMLIN includes many advanced features like a full expression evaluator, and an assembler. It can single step through programs both in RAM and ROM and allows operation on any sideways ROM. Variables may be declared and used in expressions and with most commands much like BASIC. This makes the system very powerful but simple to use. Other features include —

WORKS IN ANY SCREEN MODE
DISASSEMBLER & ASSEMBLER
FULL STATUS SHOWS REGISTERS, STACK etc.
UP TO 8 BREAKPOINTS
SINGLE STEPS THROUGH ANY ROM
BUILT IN HELP MENU
SPECIAL MODE FOR DEBUGGING GRAPHICS PROGRAMS

Supplied with simple to understand fitting instructions and spiral bound manual. £28 plus £1 p&p plus VAT

TERMI

TERMI is a general purpose communications ROM for the BBC micro. It will allow communication between the BBC and practically any other machine with an RS 232 interface. This ROM is not dedicated to emulating a particular terminal but has several modes of operation. It can be used as a slave graphics terminal or, in the custom mode, as a DEC VT52 terminal emulator. It will also act as a dumb terminal. The user is free to swap between 40 and 80 column screen modes even while on-line.

The most powerful feature of this package allows the user to send ASCII files from a BBC disc down the line or to receive files from the RS 232 and to save these on disc. It also allows a copy to be kept on the printer.

TERMI is supplied with a "CUSTOM" program on disc that allows the user to set up his own protocols i.e. line speeds, screen modes, start & stop bits etc., and to have these loaded from the disc every time TERMI is used.

TERMI is an 8K ROM supplied with a manual, fitting instructions and a customisation disc. £28.00 plus £1 p&p plus VAT.

new release

Communicator VT100 Terminal emulation

COMMUNICATOR is a single chip that plugs into a normal BBC Micro and turns it into an advanced DEC VT100 terminal emulator. The combined cost of a BBC Micro and this software is considerably less than a new VT100 — and you get all the advantages of one of the best micro computers available. A large range of high quality software is already available for this micro — word processors, spreadsheets etc.

Computer Concepts commissioned Specialist Software Products Ltd. to produce the most advanced emulator possible for the BBC microcomputer, its features include:

- ★ Exceptional XON/XOFF handshaking, even while spooling at speeds of 9600 baud.
- ★ Superb menu driven configuration — a great improvement over the real VT100.
- ★ Double height and double width character lines plus two character enhancements.
- ★ Independent windowing — for split screen operation.
- ★ VT100 character graphics.
- ★ Disc spooling and transmission of ASCII files.
- ★ Application keypad mode — including generation of these escape sequences.
- ★ VT52 mode.

Nearly a full VT100, the most notable omission is the 132 character mode — impossible to implement on the BBC Micro.

While COMMUNICATOR can be used for direct communication to a mini or mainframe, it also allows access to the world of electronic mail. This ROM is already widely used with the DAILCOM electronic mail service. Text may be prepared off-line with the BBC machine and transmitted at full speed via a modem when on-line to the system.

COMMUNICATOR is a 16k ROM supplied with a spiral bound manual and clear fitting instructions. £59.00 plus £1 p&p plus VAT.

Both TERMI and COMMUNICATOR may be used for any of the following

Mainframe or mini communication.
DEC VT52 terminal emulation.
British Telecom Gold. (Electronic Mail)
Bulletin boards of most types
DISTEL, REWTEL, MAPTEL etc.
Almost any async. RS232 communication systems.

available now

 **COMPUTER
CONCEPTS**



16 Wayside, Chipperfield, Hertfordshire. WD4 9JJ Telephone: Kings Langley (09277) 69727



From Page 164

```

;" Denary Derrick is
a bad spider who ";
CHR$ (134);"must be stopp
ed. He is carrying a"
1400 PRINT TAB(0,6);CHR$ (134)
;"number with which he
will try to land."
1410 PRINT TAB(0,8);CHR$ (134)
;"There are two ways
of stopping Derrick:"
1420 PRINT TAB(5,10);CHR$ (129)
);"(1)";CHR$ (134);"By
sending up a rocket
with ";CHR$ (134);
" the same number
as Derrick."
1430 PRINT TAB(9,12);CHR$ (134)
);"This will help you
to get";TAB(9,13);
CHR$ (134);"used to using
a key board."
1440 PRINT TAB(5,15);CHR$ (129)
);"(2)";CHR$ (134);"By
sending up a rocket
with";TAB(9,16);CHR$ (134)
);"the number which when
added"
1450 PRINT TAB(9,17);CHR$ (134)
);"to Derrick's makes
ten."TAB(9,18);CHR$ (134)
);"E.g. If Derrick has
a 7"
1460 PRINT TAB(9,19);CHR$ (134)
);"you must use 3 to
fire."TAB(0,21);
CHR$ (134);"To guide
the rocket use:"
CHR$ (131);"< Left";
TAB(25,22);CHR$ (131);
"> Right"
1470 PRINT TAB(0,24);CHR$ (130)
);"Choose game by pressin
g key 1 or 2."
1770 REM _____
1780 DEF PROCanother
1790 GZ=GX+1
1800 PRINT TAB(10,6);CHR$ (131)
);"END OF GAME: ";GZ
1810 PRINT TAB(9,7);CHR$ (130)
);"=====
1820 PRINT TAB(9,10);CHR$ (134)
);"Your score was: ";score
1830 HZ=HZ+score
1840 PRINT TAB(9,12);CHR$ (134)
);"Your total is: ";HZ

```

```

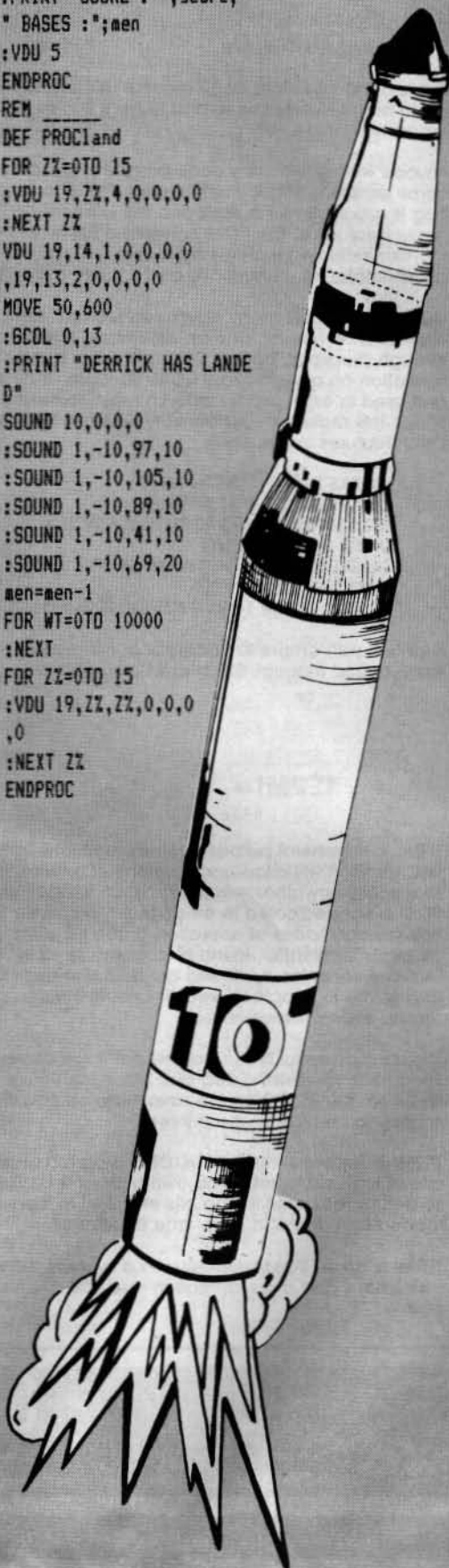
1850 PRINT TAB(10,15);
CHR$ (130);"PRESS ANY
KEY"
1860 *FX15,1
1870 VDU 23,0,8202;0;0;0;
:Z$=GET$
:CLS
:PROCintro
1880 ENDPROC
1890 REM _____
1900 DEF PROCexplode
1910 AZ=AZ+64
:BZ=BZ-32
1920 score=score+10
:SOUND 1,1,30,30
:SOUND 2,1,50,30
1930 FOR DZ=0 TO 20
1940 DRAW RND(400)-200+AZ
,RND(400)-150+BZ
1950 VDU 224+RND(10)
:GCOL 0,RND(15)
1960 CALL TEAR
1970 NEXT DZ
1980 ENDPROC
1480 ENDPROC
1490 REM _____
1500 DEF PROCinit
1510 BZ=1024
:AZ=RND(900)+100
:COLZ=8
:CHZ=RND(20)-10
1520 NIZ=NZ
:REPEAT
:NZ=RND(9)
:UNTIL NZ<>NIZ
1530 IF A$="1" KEYZ=NZ+48
1540 IF A$="2" KEYZ=58-NZ
1550 ?&70=0
1560 VDU 19,0,4,0,0,0,19
,4,0,0,0,0,0,19,14,1
,0,0,0,0,19,13,2,0,0
,0,0
1570 VDU 28,0,31,19,29,17
,142,17,13,12,4,10
1580 PRINT "SCORE : ";score;
" BASES : ";men
1590 VDU 5
1600 *FX9,5
1610 *FX10,5
1620 ENDPROC
1630 REM _____
1640 DEF PROCupdate
1650 VDU 4,12,10,17,142,17

```

```

,13
:PRINT "SCORE : ";score;
" BASES : ";men
:VDU 5
1660 ENDPROC
1670 REM _____
1680 DEF PROCland
1690 FOR ZX=0 TO 15
:VDU 19,ZX,4,0,0,0,0
:NEXT ZX
1700 VDU 19,14,1,0,0,0,0
,19,13,2,0,0,0,0
1710 MOVE 50,600
:GCOL 0,13
:PRINT "DERRICK HAS LANDE
D"
1720 SOUND 10,0,0,0
:SOUND 1,-10,97,10
:SOUND 1,-10,105,10
:SOUND 1,-10,89,10
:SOUND 1,-10,41,10
:SOUND 1,-10,69,20
1730 men=men-1
1740 FOR WT=0 TO 10000
:NEXT
1750 FOR ZX=0 TO 15
:VDU 19,ZX,ZX,0,0,0
,0
:NEXT ZX
1760 ENDPROC

```



This listing is included in this month's cassette tape offer. See order form on Page 169.

COLOURJET

7 COLOUR INK JET PRINTER

Logic seeking in
dot address mode

£499 + VAT

With Centronics parallel interface
and free BBC Micro dump listing.

Options available:

- Buffered RS232 interface.
- Viewdata & RS232 interface.
- Apple II interface.
- IBM PC dump.

Specifications:

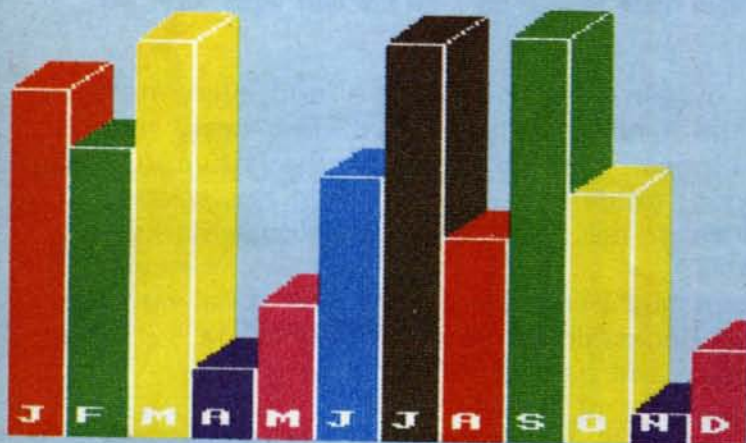
640 dots/line.

84 dots/inch both axes.

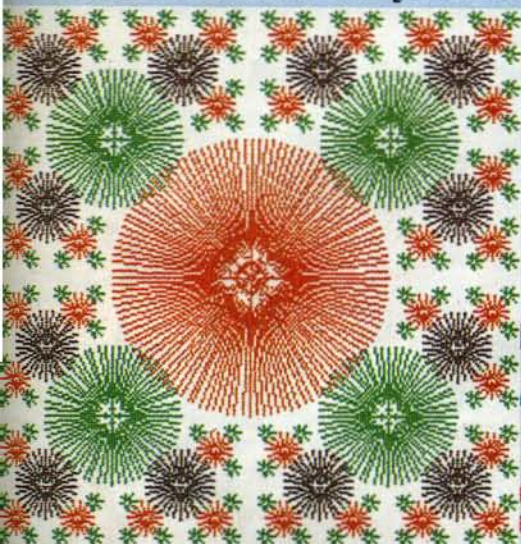
Friction feed rollpaper with single sheet
feed A4.

37cps in full colour.

Ink cartridges, 4 million character life.



from BBC Micro screen - $\frac{1}{2}$ size mode



Virtually
silent



INTEGREX LTD.

Church Gresley, Burton-on-Trent, Staffs DE11 9PT
Tel: 0283 215432 Telex: 377106

Dealers, OEM & Educational
enquiries welcome

THE MICRO USER

A subscription will ensure you get your own personal copy HOT OFF THE PRESSES month after month for the next year.

Be one of the first to get each issue!

Every owner of a BBC Micro – and everyone thinking of buying one – needs to get Micro User every month. It's the biggest, brightest, most authoritative yet completely independent guide to a machine that has so much potential you will never tire of reading about its remarkable capabilities.

You can buy Micro User from your local newsagent or station bookstall. Or you can take out a 12 months subscription and have it delivered by post.



Copies of these back issues are still available at £1.25 each



Cassette tapes and discs of Micro User programs

Take out a year's subscription and have your cassette or disc posted to you each month. You can start your subscription from any issue to take advantage of this offer. Order on the coupon opposite.

**TAPES
£3.75
each**

**DISCS
£5.75
each**

FREE

Cassette
worth
£3.75
if you
subscribe
NOW!

CASSETTE
OF YOUR
CHOICE

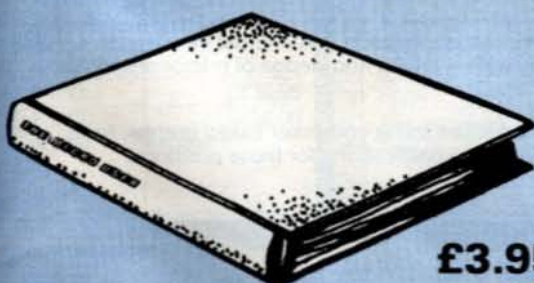
If you take out a subscription to Micro User you will receive completely free one of the monthly cassettes of Micro User listings. Choose which one you want from those illustrated below. This free gift is for a limited period, so subscribe now!

Your BBC Micro
needs protecting!



£3.95

Keep your collection of
Micro User complete with
these handsome binders



£3.95

(UK)

COMPLETE THIS
COUPON TODAY

ORDER FORM

All prices include postage, packing and VAT,
and are valid to March 30, 1984

Please enter number
required in box

£ p

Micro User annual subscription

UK £14.50
EIRE £15 (IR £18)
Surface mail - Rest of world £20
Air mail - Rest of world £65

Selected free cassette (month)
Commence with issue TOTAL

Micro User back issues

£1.50 UK
Rest of world:
£1.75 - Surface
Airmail prices on application.

March 1983
April 1983
May 1983
June 1983
July 1983
Aug 1983
Sept 1983
Oct 1983
Nov 1983
Dec 1983
Jan 1984
Feb 1984

TOTAL

Annual subscription for tapes and discs*

£40 - Tape
£60 - Disc
(UK & Overseas)

Commence with (state month) TOTAL

Single copies of tapes and discs*

£3.75 - Tape
£5.75 - Disc
(UK & Overseas)

*Please indicate which
DFS and disc
format you require

☐ Acorn ☐ 40 track
☐ Amcom ☐ 80 track
☐ Watford Other

Deathwatch Mar 1983
King Kong April 1983
Air Strike May 1983
Space Pilot Jun 1983
Tenpin Jul 1983
Fruities Aug 1983
Robin & Marian Sep 1983
Gone Fishin' Oct 1983
Blackjack / Goblins Nov 1983
Tower Bridge Dec 1983
Barrel Battle Jan 1984
Alien Invasion Feb 1984
Mazemunch Mar 1984

TOTAL

Dust Covers

£3.95 - Deluxe
(UK & Overseas)

TOTAL

Binders

£3.95 - UK
£5.00 - Overseas

TOTAL

Payment: please indicate method (✓)

TOTAL

☐ Access/Mastercharge/Eurocard
☐ Barclaycard/Visa
☐ American Express



Card No. _____

Expiry Date _____



☐ Cheque/PO made payable to Database Publications Ltd.

Name _____

Address _____

Signed _____

Send to: Micro User, FREEPOST, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

(No stamp needed if posted in UK)

Please allow 28 days for delivery

You can also order by phone or Prestel

Any of the goods listed here can be ordered by telephone. Micronet
subscribers and other users of Prestel can also use the Prestel Mailbox.

Telephone:

061-480 0171

9am - 5pm

Prestel Mailbox

614568383

24 hours

Don't forget to quote your credit card number and give your full address



SITUATIONS AVAILABLE AT

IMAGINE SOFTWARE LTD is the largest and most successful game software house outside of the U.S.A. with more than 100 staff occupying 19,000 square feet of premises throughout Liverpool. Imagine Software are at the forefront of today's exciting software industry. As a result of Imagines' advanced and imaginative expansion program the following positions have become available. In all cases remuneration is commensurate with ability and seniority and is above industry standards. In many cases a new car and numerous fringe benefits will be part of the package. Relocation assistance will be given to successful candidates wherever needed.

SENIOR SOFTWARE MANAGER

A position exists for a Senior Manager who will be responsible for several departments working in diverse areas of software design and production. Applicants must have proven experience in commercially orientated software environments and a wide range of technical knowledge and skills.

This is a very senior position with many exciting and rewarding aspects. Career prospects are excellent.

SOFTWARE MANAGERS

Two positions exist to manage large software departments at the forefront of the games industry. Applicants must have a proven knowledge and interest in computer games. A wide range of software skills and experience in managing programming staff.

SOFTWARE ARTISTS/GAMES PROGRAMMERS

Eight positions are available for programmers with both the technical ability and the creative skills needed to invent and code best selling games.

Fluency in at least one assembly language, artistic ability plus proven experience are the necessary qualifications. The successful applicants will be working in an innovative environment with the best available development software and equipment and will be provided with a high level of technical back up. This is the ultimate career opening for games programmers.

SYSTEMS SOFTWARE PROGRAMMERS

Two positions exist for systems software programmers working on very advanced products. Both positions are exciting and innovative. For the first, applicants must be fluent in the 'C' language and MCS68000 assembler and be familiar with Unix type operating systems.

Applicants must be able to demonstrate a wide knowledge of advanced development tools.

The second position requires a fluency in pascal and MCS68000 assembler and familiarity with the UCSD operating system. Experience of computer graphics and general business orientated applications software will be an advantage.

PROGRAMMERS

Thirty positions exist for programmers working in a team environment on many diverse aspects of microcomputer software, including the conversion and adaption of games to new microcomputers.

Applicants should be fluent in at least one assembly language and have great familiarity with at least one currently popular consumer microcomputer. Experience is not necessary but provable ability is a qualifying factor.

GRAPHICS PROGRAMMERS

Two positions are available for programmers with skills, experience and knowledge of microcomputer graphics as applied to games software.

Applicants must be fluent in at least one popular microcomputer assembly language and preferably have a working knowledge of one other, plus familiarity with currently available microcomputer capability. Provable experience and/or ability essential.

COMPUTER MUSICIANS

Two openings are available for programmers who have the ability to write music and sound effects for popular micros. The applicants must have a good knowledge of an assembly language and proven musical skills.

GAME DESIGNERS

Two positions exist for game designers to design a wide variety of entertainment software. Applicants will have both experience in general games design and theory plus a working knowledge of microcomputers.

TECHNICAL WRITER

An opening exists for a technical writer to prepare software manuals for both commercial products and internal development tools. A recognised writing qualification will be necessary for applicants as will a very wide working knowledge of microcomputers.

GRAPHIC ARTISTS

There are six positions available for artists working on games design and production using computer based graphic tools. A knowledge of microcomputer graphics plus excellent artistic skills are the qualifications for these positions.

Applicants should in the first instance send their C.V. to:
PERSONNEL DEPARTMENT, IMAGINE SOFTWARE LIMITED
IMAGINE HOUSE, 5 SIR THOMAS STREET, LIVERPOOL L1 6BW
or ring for an application form:- **051-236 8100 (20 lines)**

BEASTY

An introduction to Microrobotics



What is a Servo?

A Servo is a precision geared motor with a feed back mechanism to give positional accuracy. The motor rotates through 100° and allows you to twist, turn, push, pull, lift, lower, open, or close almost anything. A range of Servos are available for almost any application.

What is the "Beasty"?

The Beasty is an interface which connects directly into the BBC Micro Computer. It enables the computer to accurately control up to four Servos. The Beasty comes complete with all connection cables and comprehensive instructions.

What about the Software?

The Beasty is supplied with a demonstration program on tape which allows sophisticated control of up to four servos directly from the keyboard, in BASIC or Assembler.

FOR DETAILS CONTACT YOUR DEALER

"Beasty"
49⁹⁵
Servos
14⁵⁰
inc VAT

COMMOION

COMPUTER OPERATED MOTION

241 Green Street, Enfield, Middx. EN3 7SJ Tel: 01 804 1378

EDUCATIONAL SOFTWARE - BBC MODEL B

SKULIST... MAKE LISTS OF STUDENTS IN YOUR SCHOOL. DISC OR TAPE

SKULIST is used to input student register number, name, address, telephone numbers, sex, date of birth, form and house number (etc). Data may be sorted, entered deleted, changed and browsed. Automatic form number changes at the beginning of each school year. May be saved and loaded to tape or disc. Data may be listed to printer in a variety of formats. Students may input their own data to teach keyboard skills, screen reading and provide useful lists for school administration staff.

Program may be customised with your school name. Up to 100 entries per file may be entered. Number of files limited only by disc or tape size. Comprehensive instructions provided. Send cheque or P.O. for £7.90-Tape or £8.90-Disc (incl. p&p). Allow 14 days for delivery. Indicate Tape ☐ Disc ☐ 40 track ☐ 80 track ☐ Printer Serial ☐ Parallel ☐

MULTIPLE CHOICE EXAMINATION QUESTIONNAIRE. BBC MODEL B. TAPE OR DISC

The TEACHER may input up to 60 multiple choice questions per file and save the question files on disc or tape. The question files may then be loaded by the STUDENT and answered. The time taken and the number of correct and incorrect answers is recorded by the programme. The question files may be printed, edited, deleted and rearranged. This program removes the need to mark OBJECTIVE QUESTIONNAIRES. The program does it for you. Full instructions provided. Send cheque or P.O. for £8.40-Tape or £9.70-Disc (incl. p&p). Allow 14 days for delivery. Indicate Tape ☐ Disc ☐ 40 track ☐ 80 track ☐ Printer Serial ☐ Parallel ☐

GRAPHICS DESIGN PACKAGE. BBC MODEL B. DISC ONLY

THE DESIGNER allows freehand drawing on the screen using the keyboard but without the need for a joystick.

Features include: drawing in 4 colours, filling of any shape, drawing of boxes, triangles, circles, ellipses etc. Screen window movement, rotation and mirror imaging are standard. Sets of commands may be stored as macros for easy reproduction of similar images. Text may be combined with graphics and editing is simple. Images may be stored on disc and accessed by user written programs without the need to know BBC graphics. Useful for quickly drawing titles, attractive program instructions and explanatory diagrams etc. Any standard disc configuration is acceptable. Only one disc drive is necessary. Full instructions provided. Send cheque or P.O. for £9.95 (incl. p&p). Allow 14 days for delivery. Indicate 40 track ☐ or 80 track ☐

TAPELIB... TAPE LIBRARY PROGRAMME. BBC MODEL B. TAPE OR DISC

With TAPELIB details of up to 250 programs may be stored in memory. Data may be entered, edited, deleted, sorted, saved loaded and printed. Editing is made easy by use of the browse facility. Tape names and tape sides can be swapped when the tape name changes. Full instructions are provided. Send cheque or P.O. for £7.50-Tape or £8.80-Disc (incl. p&p). Indicate Tape ☐ Disc ☐ 40 track ☐ 80 track ☐ Printer, Serial ☐ Parallel ☐ Allow 14 days delivery.

JONSOFT

Baitings Mill, Norden, Rochdale OL12 7TQ,
Lancashire.

A Full One Year Warranty offered on all the products we sell.

Full Pre/Post Sales Support.

PRINTERLAND



EPSON RX80

- 100 CPS 9 x 9 matrix
- True descenders
- Bit image graphics
- 11 character sets
- Very reliable

RX80T £219.95

RX80F/T £239.95

- FREE Screen dump (Cassette)

STAR GEMINI 10X

- 120 cps 9 x 9 matrix
- User defined ch'rs
- Friction/tractor and roll holder
- Macro instructions

10X £198.95

15X £315.00

- Free Hi-Res. cassette

COPY ALL DISK

- Copies ALL protected disks inc. tape to disk utilities.
- So good it even copies itself
- Simple to use
- Includes sector editor

Copy All £10.50

ORDERING INFORMATION

- Orders received before 3pm- same day despatch
- Government, Educational orders welcome
- Credit Cards - just ring your order through

Carriage printers/monitors £7

24hr Delivery

OTHER - 50p (1st Post)

Please add 15% VAT

EPSON FX80

- 160 CPS 9 x 9 matrix
- Proportional spacing
- Downloadable ch'rs
- 2K Ram Buffer

FX80 £329.95

FX100 £434.00

- FREE Hi-Res. cassette

BROTHER HR15

- 18 cps • 3K Buffer
- Proportional Spacing
- 2 Colour Print

HR15 £369

Sheet Feeder £199

Tractor Feed £75

MONITORS FIDELITY CM14"

- RGB • RGBY
- Composite video
- Works with all micros & VCR's

CM14 £169.95

PHILIPS 2" Green

- 80 Column & Graphics

P80 £74.95

ACCESSORIES

WORDWISE £32.00

"The" Word Processor

Printer Cable £10.99

BASF SS S/D Disks £10.99

(Box 10)

Paper (2000 shts) £12.00 +
£3.00 carriage)

UNIT 25, 2 RAILWAY STREET, HUDDERSFIELD HD1 1JP TEL. HUDDERSFIELD (0484) 687928

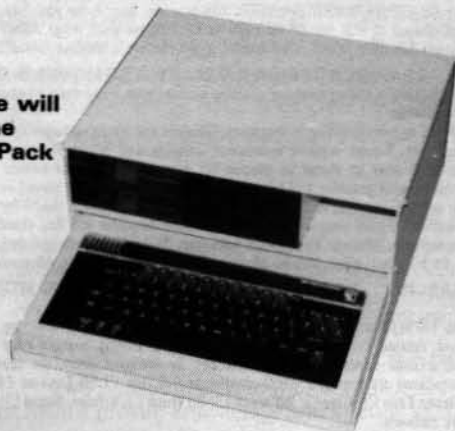
BBC MICRO CONSOLES

"As supplied to BBC, Universities, Colleges, Schools etc."

Not just a monitor/tv stand but an expansion console which gives your micro the professional look. Protects and encloses your micro with room for disc drives and 2nd. processor or teletext adapter etc., all untidy connecting wires safely out of sight within the console. Made of light yet strong aluminium with a textured finish in matching BBC colour. Available now a bolt on extra module to the console for further expansion options. YES this console will grow with your needs. Basic BBC console as shown **£39.99 + £4 carriage***

After 31st March console price is £44.99.

*The console will house the Torch Disc Pack



EXPANSION MODULE
only **£14.99 + £2 p&p**

"Matching printer stand available yes stick your paper under the printer". Only **£14.99 + £2 p&p**

VDU STANDS FOR ELECTRON & BBC

Acorn owners who only need a VDU stand will find the stand slip over the micro with adequate ventilation allowed for. After use the micro slips UNDER the stand acting as a dust cover. VDU stand BBC & Electron only **£14.99 + £2 p&p**



Add VAT @ 15% to all prices
MAIL ORDER ONLY
Viewing by appointment only

For further information or send cheque to:

Silent
COMPUTERS

27 WYCOMBE ROAD, LONDON N17 9XN.
TEL: 01-801 3014 (24 Hr Ansaphone)

Give your BBC Micro a REAL voice.

With the Voxbox voice digitiser.



Normal human voice can now be stored on disc and accessed from your own programs. Store words or phrases in English or any other language. The Voxbox comes complete with a speaker, microphone and full operating software to enable you to build your own voice files. Just plug into the User Port.

It speaks for itself. **£89.00 all inc.**

Multiplex Computer Services
250, Eastern Road, Brighton BN2 5TA.
Tel: (0273) 606860

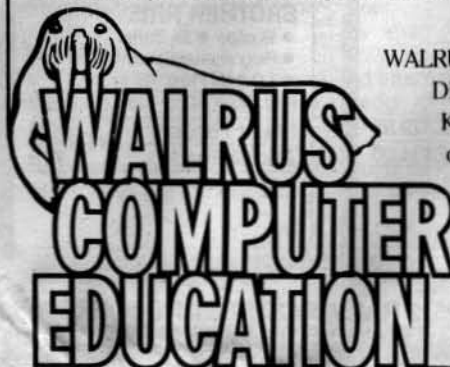
WALRUS COMPUTER EDUCATION

Don't leave your BBC Micro or Electron on the shelf. Use it – and a WALRUS home study course – to teach yourself structured programming.

STRUCTURED BASIC ON THE BEEB/ELECTRON

- ★ Specially designed for the beginner ★
- ★ Set out in ten lessons ★
- ★ Includes software cassettes with lots of educational programs ★
- ★ Assignments for tutor feedback ★
- ★ Comes in two teaching packs ★
- ★ Costs only **£24** ★

To receive your first teaching pack, send cheque/PO for £24 to:



WALRUS Computer Education
Dial House, Laycock,
Keighley, W. Yorks.
or write for leaflet.

SOFTWARE - Programs that are guaranteed to run! Save hours of work and worry with these utilities, educational & business programs on cassette or disc.

102	CASHBOOK	Double entry 4 columns with accounts & analysis	£11.95	B	520	BANNER	Print giant text and graphics on paper for displays	£3.95	A/B
102d	CASHBOOK	Full disc version. 1200 items on 100k disc	£19.95	B	521	BIGLETR	Print as above on screen/paper with screen dump	£5.95	A/B
103	LEDGER	Complements CASHBOOK with ageing & analysis	£11.95	B	600	FORTH	79 FORTH second language ROM	£34.74	B
105	MAILING	Holds 218 addresses. Alpha & post code sorts, searches, any label format, delete, add and amend	£11.95	B	601	LOGO-FORTH	Advanced Turtle Graphics Language ROM with FORTH	£57.50	B
106	PAYROLL (W or M)	In 2 parts to handle weekly or monthly (state which) PAYE & NI for 100 employees. Fully supported	£24.95	B	602	PASCAL-T	Structured language ROM with compiler-interpreter	£57.50	B
107	MEMO-CALC	Database/Calcsheet with up to 255 columns, string or numeric data, sorts, searches, calculations.	£12.95	B	603	XCAL	Computer Assisted Learning ROM for presentations	£65.00	B
201	GAMES 1	5 Card, Minefield, Darts, Pontoon & Mr. Midon	£5.95	B/E	605	WORDWISE	Superb fast & easy to use wordprocessor in ROM	£33.95	B
202	STOCKMARKET	Exciting world of Stocks and shares, 1-4 players	£5.95	B/E	606	CDUMP	Screen dump, 8 colours, suitable for GP700A	£12.95	B
301	HANGMAN	Word game in English, French, German, Italian, Spanish	£7.95	B	607	GDUMP	Screen dump ROM, 8 shades, 8 sizes and windows	£17.95	B
302	DISTANCES	Three graphic maps of U.K., EUROPE & the WORLD. Calculate the distance between any 2 places	£4.95	B/E	608	DISKDOC	ROM for disk problems in format, search, files etc.	£27.50	B
303	FLAGS	98 full colour flags of the world with questions	£4.95	B/E	608	GRAPHICS	NEW ROM for Sprites, LOGO, circles, fill etc.	£27.50	B
304	STATPACK	Statistics package giving over 30 results	£9.95	B	700	BOOKS	Various titles for the BBC Micro from C15 Computer quality tapes packed in 10's	£6.95	
305	GRAPH	Produce varied graphs & charts of functions	£7.95	B	801	CASSETTES	MEMOREX: SS/SD 40/80T	£19.95	
306	FRENCH	New audio visual computer way to learn a language	£7.95	B	810	5.25" DISCS	SS/DD 40/80T	£20.95	
307	SPELL-CHECK	Add to WORDWISE. 15000 words in 12 dictionaries	£17.95	B	900	SEIKOSHA	GP700A 7 COLOUR 30 shade dot matrix printer 50cps	£369.00	
504	PROCAID	Includes SEARCHBAS to search a BASIC program and alter it, PROCVAR to list variables in a BASIC program & PROCFLUSH to clear resident integers in RAM	£3.45	A/B	901	EPSON RX-80 T/F	Superb. 100cps with Tractor & Friction feed	£275.00	
505	UTILITY-A	Our best selling tape includes PROCAID, DEFCHR to design & display graphic characters, SORTM/C a very fast machine code numeric sort, SORTBAS the undisputed fastest BASIC sort routine	£5.95	A/B	902	EPSON FX-80	Magnificent. 160cps, 6 founts, graphics, F/T Roll	£365.00	
					910	DISC DRIVES	Slimline 3" or 5 1/4" 100k - 800k Japanese. Format disc, cable and excellent manual.	£189.00	
					915	DISC UPGRADE	From Double & Single Density available in one system	£77.50	
					920	VDU STAND	Stainless Steel Support protects your micro	£19.95	
					930	GREEN VDU	12" Green Monitor, cream sloping front case	£79.95	
					931	COLOUR VDU	JVC 14" Colour Monitor 370 x 470 pixels	£179.95	
					950	SAT-16 MPU	16 bit 68000/68701 stand alone computer from	£570.00	

ADD VAT TO ALL PRICES EXCEPT BOOKS.

ADD £1.75 FOR PROGRAMS ON 40 OR 80 TRACK DISC. NO POST CHARGE IN UK. MOST PROGRAMS AVAILABLE ON MICRONET 800.

Send for our free brochure for more information before parting with your money.

Micro-Aid (MU)

25 Fore Street, Praze, Camborne, Cornwall TR14 0JX

Tel: 0209-831274

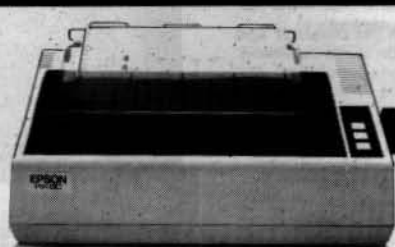
CORTEX computers

**AT RYMAN, 1st FLOOR
6-10 GT. PORTLAND ST.
LONDON W1
TEL: 01-631 0464**



JUKI 6100
£399 inc VAT

The outstanding value for money daisywheel printer. Superb quality print, proportional, 10 or 12 pitch Adler daisywheels. 18cps bidirectional. Full Diablo protocol. Centronics interface. 2k buffer.



EPSON RX80 FT
£299 inc VAT

The new inexpensive Epson printer. Many of the features of the FX80, but 100 cps. Enlarged, condensed and italic characters. No proportional characters. Superb graphics. Built in tractor and friction feeds.



EPSON FX80
£399 inc VAT

The new Epson high speed matrix printer. Friction and 9 1/2/10 inch pin wheel feeds. Tractor extra. Good quality print including proportional and down-loaded characters. Superb graphics. 160 cps.

JUKI EXTRAS

Daisywheels - send s&e for sample print-outs **£16.10**
Ribbons - multistrike **£3.00**
Tractor **£103.50**
Sheet feeder coming soon
Cables - for BBC **£15.00**

EPSON EXTRAS

Ribbons. Best quality fabric **£5.50**
Cables - for BBC **£15.00**
Serial interfaces for VIC **£52.00**
Internal buffers. 16k, 32k, 64k from **£99.00**
Tractor for FX80 **£35.00**

All prices include VAT. Postage on Printers £10.

☐ Send me your full price list
Send me ☐ Juki 6100 ☐ Epson FX80
☐ Epson RX80FT ☐ Other items as listed. I enclose cheque for £
Charge my Access/Visa card No.

Name _____
Address _____

****AIDS II****

PROGRAMMERS UTILITY ROM

**Soft
smith**

An essential tool for all BBC Micro programmers – saves time and tedium in program management. Brings 12 major new functions, with 5 new commands, and a HELP shortlist. Takes no user RAM.

***LLIST**

Program listing perusal, using cursor keys to shift back or forth by a page or a line at a time. Single-key entry to Search routines – see opposite.

***LREN**

Intelligent Renummer of up to 255 lines of a program; All cross-references updated e.g. GOTOs, GOSUBs.

***LMOVE**

Move up to 255 lines to anywhere else in the program, again updating all cross-references.

***LMERGE**

Copy up to 255 lines to new locations. Source can be any program in memory. No cross-referencing. All the above routines check for logical errors and issue specific messages, preventing accidental mistakes.

=====

***AIDS** entry to main MENU offering the following choices:

Printer

• Simple 'toggle' copies all *AIDS output to printer.

Disassembler

- Full listing format with data shown in Hex & ASCII;
- Direct disassembly of any sideways ROMs;
- Output can be saved to a file & *EXEC'd back for editing, relocation & re-assembly.

Memory Editor

- Display blocks of memory, including other sideways ROMs, in Hex & ASCII.
- Single-key controls to shift back & forth by block or byte;
- Search for byte string – defined in Hex or ASCII.
- Overwrite any section – Hex or ASCII mode.

Search/Replace string

- Search current BASIC program (anywhere in RAM);
- Search string (1-30 chars) can include BASIC keyword tokens & 'wild cards';
- Each occurrence highlighted within whole program line;
- Options then available include: find next occurrence, *LLIST program from that point, **Replace** string by previously defined string (0-30 chars), etc.
- Ideal for generating variable/PROC 'where-used' lists;
- **Program repair** makes any 'Bad Program' available for editing.

Variable Dump

- Lists the names & contents of all non-array program variables;
- Shows all array dimensions.

List Formatter

- Lists program (even 'Bad Programs') in clear easy-to-read format;
- Line number displayed in column of its own
- Indenting for FOR & REPEAT loops, and PROC definitions
- Each statement on a new line
- BASIC keywords highlighted on screen, most without wrap-over.

Beeper

- Invokes automatic beep on every key depression; even in WORDWISE.

Suitable for A & B models, with **MOS 1.2 BASIC II** compatible.

Price, including p&p, & comprehensive 24-page manual:

£21.00

(Upgrade price for Version 1 owners – £12.00)

S.a.e for more details; Dealer enquiries welcome.

Send cheque or P.O. to: **Softsmith**

9 Back Green, HERSHAM, Surrey KT12 4HY

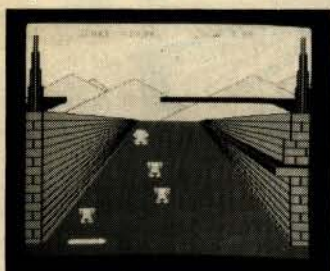
DYNABYTE

EXPLOSIVE

Software



NEW! Lemming Syndrome



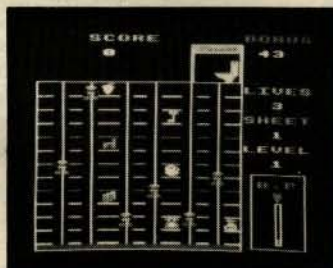
Mad Marco is on the rampage and has blown the bridge to the mainland. The panic-stricken population are hurling themselves into the shark infested waters and your job is to bounce them to safety whilst avoiding the marauding sharks and the desperate attempts of Marco to blow up your liferaft. This highly original, fast and furious game is full of special features and options designed to make your task harder as you get better.

Machine Code 32k **£7.95**

Corporate Climber NEW!

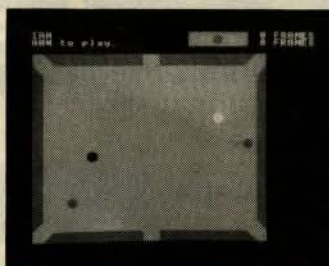
Caught in the capitalistic pursuit of corporate expansion, your ambition is to attain the ultimate accolade – the key to the executive washroom! Avoid the eager taxmen in the lifts ready to hinder your climb to power and beware of too much stress resulting in high blood pressure. **Definitely not for the faint hearted entrepreneur.**

Machine Code 32k **£7.95**



A SUPERB range of QUALITY Programs for the BBC micro

Pool



Classic representation of the real thing incorporating excellent high resolution smooth action graphics for accuracy and making full use of sound. **Start practising now and avoid being hustled.** You control the cue angle and strength of shot. A real pleasure to play.

Machine Code 32k **£7.95**

Horserace

An exciting and colourful game complete in **every detail** with tumbling jockeys, realistic horses, TV van, tote and leader boards, waving crowds and much more. Don't lose your money at the track, try **HORSERACE** instead. Suitable for 1-6 players.

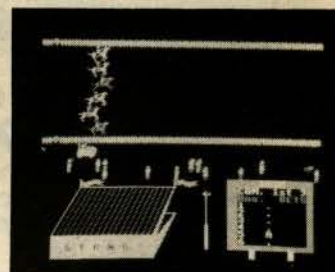
Basic + M/C 32k **£6.95**

(All programs require Series 1.0S)

Also available:

MULTI-AID (32k) £7.95: A powerful and **impressive** 3 program utility. You receive a complete **TELETEXT** editor, **MULTI-COLOURED** character definer and a **SOUND GENERATOR**, all complete with full documentation and keystrips. Excellent value and quality guaranteed.

BRAIN TEASERS (32k) £5.95: Six thought provoking games including Reversi, 3D OXO, Mastermind, For42, etc. Superb family fun.



All programs available from most good computer shops or direct from

DYNABYTE SOFTWARE,

31, Topcliffe Mews, Wide Lane, Morley, LS27 8UL.

SAE for Catalogue

(Please include 50p p&p)

Trade Enquiries Phone: 0532-535401

MICROMAIL

Time manufacturers gave discs their due

I READ with no little sympathy the letter from Mr Palmer in the January 1984 Micro User in which he complained about the problems of transferring programs from tape to disc.

The simple fact is that software suppliers in this country themselves are responsible for forcing users to resort to criminal extremes to be able to use the software that they have purchased.

The software manufacturers are simply going to have to take a more responsible attitude toward their customers if they hope to survive in an increasingly competitive marketplace.

Consider this: In Cambridge where I live there are at least half a dozen software retailers selling products for the BBC.

In the last two days I have conducted an unofficial survey and I am sorry to have to report that, apart from a few Acornsoft games (about half of their line), I was unable to find a single disc copy of any game for the BBC for sale.

This is the situation that disc-users must face.

You cannot buy a disc copy of software for the BBC and if you buy a cassette copy and upload it to disc (assuming that you are clever enough to figure out how to do it in the first place), you are threatened with prosecution.

It is unfair that Acornsoft have taken the brunt of the

criticism recently over this matter. At least they do manage to distribute a few disc copies of some of their products, which is more than any other software house can say.

Yes, I know that other software manufacturers advertise disc copies, if you are willing to mail-order the product. In addition to having to wait from between one and four weeks to get the disc in the post, in some cases you have to pay an outrageous additional charge of up to £4 for the disc.

An additional charge of £1-£2 is fair for the extra handling and packaging necessary to insure the safety of the discs, but £4 is immoral.

So what are the alternatives? In addition to learning how to transfer most of the software himself, a disc user can buy special products to upload programs for him.

I have a copy of the new and improved version of the most popular of these items, but there are some games (and not only long adventure games) that it still will not handle.

There is still the unresolved legal question of which the user of these items must be aware.

But this is not a long-term solution to the problem.

In the end the only possible solution lies with the software manufacturers, distributors, and retailers.

They are simply going to have to realise that cassette storage is rapidly becoming an obsolete medium, even for the home user.

The change is going to be forced upon them in the next few years whether they like it or not.

Hopefully the more responsible of them will take the initiative by seeing that disc versions of their products are readily available to the purchasers.

Only by doing that will the suppliers have a basis for distinguishing the pirates from the legitimate users who simply want to enjoy the software that they purchased.

In the meantime I have decided not to purchase software from those houses that protect the material to such an extent that it cannot be uploaded to disc without extreme effort.

It is not much, but it is all that I can legally do.

At the moment there are two software houses on my personal "blacklist" and they can rest assured that they will be getting no more money from me.

My only hope is that they go out of business as soon as possible. — D.L. Adams, Cambridge.

Improved joystick

I HAVE a tip for all the BBC Micro owners who own the Cambridge joystick — the non-self centering one.

The idea came to me while playing Rocket Raid, and I felt the need for the joystick to go back to the middle after each movement.

All you do is put two thick

elastic bands round the lever. Pull one round the bottom and the other round the cable at the top.

This will affect the joystick so that after any movement it will return to the centre. — Matthew Lemmings, Staines.

Cherished facility

I WAS very interested to read the letter from David Bye in your December 1983 issue.

If he feels like that about the use of the features of the BBC machine why is he reading your magazine anyway?

He could have bought a cheaper machine which didn't allow him to use procedures, functions and such.

It strikes me that he must not have used one of the machines or he would not have written some of the things that he did.

He says, for instance, that the Acorn compilers were waywardly silly in using a value of -1 for TRUE and so denying him the facility of writing "IF X and IF NOT X".

If he had tried this he would have found that it would work exactly as it should.

It is true that IF X would be satisfied by any value other than 0, but none of these other values would satisfy the statement IF X = TRUE.

A study of the way in which computers work would have shown that -1 is the only value that could be used for TRUE and still allow FALSE to be zero, as the value of NOT 0 is -1.

So far as procedures are concerned he says that "the only advantage of PROCs lies in their control variable facility" and that most people don't need this.

I am not sure what he means

How to save the Sphinx

REGARDING Alice's review of Sphinx Adventure (The Micro User, January 1984, Page 40), it IS possible to save the game during play, although Acornsoft does not tell you how to do it.

To save Sphinx Adventure:

When you are ready to save the game, press Escape.

Enter *SAVE"SPHINX" 0400 7C00 to save the first part.

Enter *SAVE"ZERO" 0 90 to save the second part. The game is now saved on tape.

To Reload:

Enter *LOAD"SPHINX" to

load the first part.

Enter *LOAD"ZERO" to load the second part.

Enter GOTO 236 to restart the program.

The micro will now display the last location you visited before you saved the program, then it will wait for your next command.

It is important that the two parts should be reloaded as shown above, otherwise certain variables will have the wrong values. — R.W. Crisp, Leeds.

MICROMAIL

From Page 175

by this but I know that many people are very glad of a facility which allows them to pass parameters to a subroutine without altering the value of a variable in another part of a program.

Even then I suspect that the major advantage of procedures and functions is their use of LOCAL variables.

Because of this facility I am gradually building up a library of functions and procedures which I can, after they have been tested, store on disc and call in to any program without needing to know which variable names have been used.

I also know that these procedures will work and that any error must be because I have passed an incorrect value rather than an unsuspected interaction with another part of the program.

An additional advantage of programming in this way is that, if the program needs changing – and it almost certainly will if it does anything useful – it is much easier to see where the changes should be, and what their effect will be.

In 1970 and 1971 I was very much involved with the amendment of computer programs to cope with decimalisation.

Anyone who has had that sort of experience will not need much persuading of the virtues of the modular construction of programs.

All the programs worked but finding out how, so that they could be modified, was a herculean task.

I have not had my machine long enough to try all the features of BBC Basic but it is my understanding that procedures are, in fact, faster than GOSUBs in large programs as the system records their position.

When I started programming some of the existing programmers looked down on Cobol because "real programmers use assembly languages".

It seems to me that some of this attitude still lingers and it is very much on a par with "good drivers don't need seat belts" and "I know when I have drunk too much to drive".

Mr Bye isn't forced to use the facilities he doesn't like, but I hope that nothing of mine ever depends on one of his programs! – David H. Wild, Hemel Hempstead.

Recorded delivery

MOST of us at times find trouble with cassette loading, and I have had some success in overcoming the problem by resorting to my audio equipment.

I have a BBC Model B (OS 1.2) and being very interested in graphics had, among my Christmas presents, a copy of the Acornsoft "Creative Graphics" cassette.

I found that while side A of that cassette loaded without the slightest trouble, side B just would not load at all and produced nothing more interesting than a flood of "Rewind Tape", "Data", etc.

It would seem the copying for side B had not been up to the standard of side A – I can think of no other cause.

So I resorted to my audio method of solving the difficulty as I had successfully done so before, and indeed did on this occasion solve the problem.

I simply place the offending cassette into a cassette recorder and transfer the "sound" from it to a reel to reel machine running at 7½ ips (19cm), using manual control over recording levels on the reel to reel machine, and so far as I can, ensuring optimum modulation of the reel to reel track recording.

I then reverse the process and transfer the "sound" from the reel to reel machine and re-record it on to a cassette at normal cassette speed.

I do not usually transfer it

back on to its original cassette tape, preferring to retain that recording – warts and all – as a master.

So I use a separate cassette to record the "copy" track, and again I control recording levels manually.

I have usually found that this re-recorded cassette track will load quite satisfactorily into the computer, as indeed it did on this occasion.

So I now have a perfectly usable copy of side 2 of "Creative Graphics" which works well on my computer without any loading problems, and the original master cassette track works beautifully as far as its side 1 is concerned.

Your readers may find this method a useful way out of trouble. A reel to reel machine is not essential – the system works with two cassette machines, but a transfer to reel to reel recording at 7½ ips is more satisfactory and reliable. – Norman Gill, Wakefield.

Hong Kong take away

A LETTER from Mr D.R. Stafford, Camberley House, Surrey was published in your January 1984 issue. Mr Stafford's letter made nonsense of my May 1983 letter to you (published in your August 1983 issue), whereby I was adamant in stating that all BBC Micros, sold in the UK, are manufactured in the UK.

As I am sure you and your readers are aware, the demand level for the BBC Micro continues to be extremely high. As an exceptional action, to balance the demand, approximately 1,000 Hong Kong-assembled machines were imported for sale in the UK. These machines were the exception.

Elsewhere in your January 1984 issue mention was made of the fact that recently purchased machines had Basic I fitted. I

hope you can appreciate that the BBC Micro takes a varying amount of time from the kit to the final product, so that at any time BBC Micros offered for sale can represent a range of versions. – Colin Malone, for Head of Merchandising, BBC Enterprises.

Unconditional surrender

I FEEL compelled to "put my oar in" on the structured v. unstructured debate.

While I do agree that GOTO is essentially a poor instruction, especially it jumping forwards, why write code then slip over it?

This has to be silly and wasteful – I do not agree that GOSUB should be considered in the same class.

Not so long ago I wrote a piece of quite involved code for simulation purposes. During this, it was found that one piece of code would suffice for several different operations provided different entry points were used for each.

In Basic this was simple – a series of GOSUB calls all utilising the same RETURN.

With PROC I cannot, yet, see an easy solution. It would be possible to use a dummy variable to cause a jump over the (temporarily) redundant code, but oops, that's GOTO isn't it?

Actually I do have another suggestion, whether it would work I don't know:

```
10000 PROC A(. . .)
10400 GOTO 10600
10506 PROC B(. . .)
10600 . . .
```

But that wouldn't be popular with the "structuralists" either, would it?

As a final comment, while I agree with Dr E.T. Freshwater of Leeds, (Micro User February 1984), I think that the main thrust of the structuralists is against the unconditional GOTO rather than the conditional.

The latter would seem essen-

tial if branching in programs is to occur at all! — J. Comerford, Leicester.

● Actually you can obtain this sort of an effect by having several different procedure starts defined (that is, DEF PROCs) with only one ENDPROC to finish. The following program should make the point.

```
10 PROCA
20 PROCB
30 PROCC
40 END
50 DEFPROC A
60 PRINT "NOW IN PROCA"
70 DEFPROC B
80 PRINT "NOW IN PROCB"
90 DEFPROC C
100 PRINT "NOW IN PROCC"
110 PRINT "ENDING THIS CALL"
120 ENDPROC
```

Lowdown on OSCLI

COULD you please explain OSCLI? The listing I enclose gives my computer's full spec, then a disassembly of the OS routines, which indicates that as per handbook OSCLI vectors through &208.

But the disassembly from &200 does not have a &208 in it — why?

The memory dump of that area shows &208.

The other strange thing is that if I type as a direct command OSWORD or any of the other routines I get "Mistake" as a reply, but when I type in OSCLI I get "No such variable". Why? — G. Coventry, Chippenham, Wiltshire.

● &208 is an area of vector data. This part of the memory contains numbers which point or vector to another part of the computer where there is machine code.

The idea is that the bytes around &208 aren't machine

Capacitor can clear screen

WITH reference to the Micromail letter concerning "drifting lines" that occur across the screen, I would like to say that this is common not only to Sony TVs but to many others used with certain BBC computers.

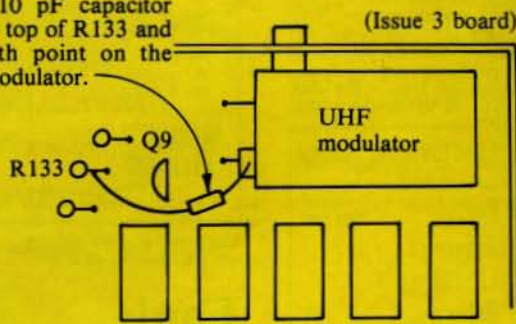
I have written to Acorn about the problem and according to them it is a fault in the TV.

This is not so, and differing BBC computers suffer the problem to greater or lesser extents — a few, not at all.

The problem is probably either due to beating between the chrominance and luminance signals or between the chrominance and a subharmonic of the CPU crystal oscillator.

Adjusting the trimmer will only offer temporary alleviation and is no real solution.

Solder 10 pF capacitor between top of R133 and the earth point on the UHF modulator.



I have found that for many TVs, Sony included, the set requires only a very small chrominance signal to give good colour, so a simple but effective long term solution is to solder a small 10 pF capacitor across the base of the chrominance output transistor Q9 (across the resistor R133, 120k).

This is very simply done without removing the PCB and without the need for a very steady hand, as shown in the diagram.

It may be easily removed at a later date if required, and will cause no harm to the computer. — Andrew Mackay, Northwood, Middlesex.

code, they just point to the start of something that is, so disassembling them gives nonsense.

In your hex dump &208, contains &89, &209 contains &DF. These locations store the address &DF89, backwards.

When the micro sees JMP(&208), it "decodes" this address from where it is hidden at &208 and &209 and jumps to that address, in this case &DF89.

You might ask why you go round the houses like this — it's usually easier to jump directly to the address with JMP&DF89.

The point is that this way you can fiddle with the address at &208, &209, since they are in RAM (unlike the JMPs at &FFCE onwards).

This way you can make the micro jump to your own routine and to what you want — in other words, you can tailor the machine to your own specifications.

It also allows Acorn to modify things later. If they change the address of a routine in ROM, all they have to do is alter the vector table.

So long as you call through the jump table, as it is known (&FFCE etc), you won't notice a thing.

This means your programs work on both "old" and "new" machines.

As for OSWORD, it isn't a word that the computer recognises, so it says "Mistake".

I know we talk about OSWORDS, but the computer doesn't know it by this name — you have to CALL it through the jump table. You can set it up as a variable by using OSWORD = &FFF1.

As for OSCLI, you must have Basic II. This has a word called OSCLI, but it needs values or parameters to go with it.

If you just type OSCLI it looks for them and fails to find

them, so says "No such variable", a slightly confusing message.

On Basic I, OSCLI isn't recognised at all and you simply get "Mistake".

Tape handling

IN answer to Mr Pentecost's query on tape handling (Micro User, January 1984), if he uses *FX138,0,13 immediately before each OPENOUT he will not need to type a Return at the keyboard. Details of this call are given on Page 433 of the User Guide.

OPENOUT, OPENIN, OPENUP, CLOSE all effectively call the OSFIND routine at &FFCE. This is described on Page 451/2 of the User Guide.

Astute readers will notice that

MICROMAIL

From Page 177

the value of A on entry produces operations exactly equivalent to Basic II functions.

```
A=0, Y=? → CLOSE Y
A=&40 → OPENIN (not
implemented in Basic I)
A=&80 → OPENOUT
A=&C0 → OPENUP
(OPENIN Basic I)
```

So to OPENOUT a File called FRED in assembler use:

```
.openout LDA#138  / bbyte
number
LDX#0 / Buffer
number (keyboard)
LDY#13 /
Carriage Return
JSR &FFF4 / Call
Osbyte
LDX# FILENAME MOD
256
LDY# FILENAME DIV
```

```
256 / get address of
filename
LDA#80
/openout
JSR &FFCE
/Call Osfind
OSBPUT ROUTINE TO FILE
RTS
/ Return to language
(Basic)
.FILENAME
EQU#FRED*CHR#13
```

— Geoff Cox, Gillingham, Kent.

Fault at line 50

WITH regard to the Beasty Competition (Micro User, February 1984) I have programmed

line 30 according to the book, that is 30 PROCpic(0,0,1) but when I attempt to RUN the program the machine indicates Arguments at line 30.

As I only had the system at Christmas I am afraid I do not understand where I am going wrong. — Rodger Gregory, Nottingham.

● Thanks for your letter, especially for giving us the page number and issue. If only everyone were so kind.

Line 30 CALLs a procedure, which is another part of the program. You tell the computer what this part of the program does by defining it — look at line 50.

Now when you call a procedure, you have to hand on values to it — passing parameters. What you're handling on is in the brackets of line 30, separated by commas. These are called arguments.

The computer needs something to receive what has been passed to it. If you look at line 50, you can see three variables, X%, Y%, S, ready to catch what line 30's procedure has passed to it.

The X% receives 0, the Y% gets 0 and S gets 1.

If the number of things your passing doesn't match up, or you try to pass a string to a numeric variable, you get the arguments message for the line you called the procedure from.

The point is, if you've made a mistake on line 50, perhaps missing out a comma, the micro believes this line be the true definition of procedure, so it decides that the line you call it from is at fault.

In this case it says line 30. However, the version you've got in your letter looks correct. Therefore, we think you'll find the fault is at line 50.

And finally, with tongue firmly in cheek . . .

TILTING AT WINDMILLS . . .

Dear Trev,

Sorry that I haven't written for so long, but I think I'm going quietly and irrevocably mad. And it's all the fault of Micro User.

They asked me to try out a new game they were thinking of printing called Lancelot and Guinevere. Well I've always fancied that I'd make a good joustier, so I decided that I'd type it in.

As you know, and Andrea keeps telling me, I've been stupid since the day I was born, but since I've had my micro I've been able to prove it.

The first mistake I made (or second, if you count starting the damn thing in the first place) was to turn over two pages at once and start typing in the wrong listing halfway through.

When you think about it I should have realised sooner. After all, it's unlikely that a listing with PROCchivalry and PROC-Merlin and lines like IF virgin THEN PROCunicorn would contain a PROC-lightpen. As it was, I typed in a whole page before I realised.

Mind you, it wasn't much better when I got back onto the right listing. Do you know the Number of the Beast? Well it's not 666 as you might think, it's line 340. It took me 27 attempts to get that one right, and even now I'm sure that Beeb only accepts it out of

sympathy.

Not that I got much from Andrea. Sympathy, I mean. She couldn't see what all the fuss was about, but eventually, saying she couldn't stand the screaming any longer, she decided to help. And I accepted — my morale and judgement were that low!

A. said that she'd read the listing out to me while I typed it in and it seemed like a good idea at the time. I wiped the tears and sweat off the keyboard (the blood nearly came later) and settled down for what would be positively my last attempt.

And it seemed to work. She dictated and I typed. Then came the moment of truth. I entered RUN and pressed Return (as they say in the beginner's books). I was so nervous that I closed my eyes as the opening tune, "Colonel Bogey", played. I knew disaster had struck when I heard A. ask: "Should Lancelot be doing that with his lance?"

No he shouldn't. And I had grave doubts that Mark Smirky, the guy who wrote the program, really meant the score table to be round. Against my better judgement I listed the program. It was rubbish.

"What have you done?" I screamed at A., my fingers curling menacingly around the User Guide. "You were supposed to be reading it all out".

"Well, I only corrected the punctuation", she screamed as she beat a hasty retreat, leaving me with my loathsome listing and a near coronary.

Still that wasn't the worst. The worst was my nasty nephew Nigel who just "happened" to call round. I suspect A., but can't prove it. The little horror has an Electron (which explains the "If it doesn't use Mode 7, it isn't worth doing" sticker on my Beeb).

Of course A. told him of my predicament and he offered to help. In my less paranoid moments I've little doubt that it was all done in a spirit of charity, but I did object to his groaning and laughing as he sorted it out. I particularly objected to the way he kept muttering "Dim, dim" under his breath.

Eventually the little horror had it working and he left, but not before he'd had a word with A. I was listening from the top of the stairs and distinctly heard the phrases "at his age" and "ZX81".

And now I have a working version of Lancelot and Guinevere and the challenge seems to have gone out of life. I haven't even bothered to play the game.

Who was it said "it is better to travel than to arrive"? He'd obviously typed in a few listings in his time.

Yours in adversity,

Bob



PAEAN systems

PROGRAMS FOR BBC MODEL B

Quebec Marketing MU, Little Bealings,
Woodbridge, Suffolk IP13 6LT.
Tel: Ipswich (0473) 623757

NEW



DELIVERY £7.50

Drive yourself mad around this maze adventure. You will have to stay pretty cool to avoid trouble, cope with a myriad of hazards, not to mention a bolshy mate, and get your deliveries right, all at the same time. The Law is never far behind... so watch out! Full scoreboard. Optional sound. Keyboard.



SCAN £7.50

An original card based game of great subtlety. The idea is to place 25 of your 26 cards in positions which equal or are greater than the value of the computer's cards. Excellent graphics include clues about the suits and values of the computer's hidden hand - you must be very shrewd to win the maximum 40 tricks. Keyboard.



LIGHT CYCLES £7.50

A fast reaction game for the fleet of hand and mind. Can you surround the enemy with your light trace and make them crash? The better you are, the more cunning and numerous the enemy become. Simple and infuriating. Full scoreboard and sound. Keyboard.

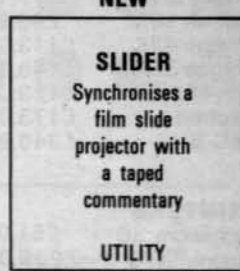
NEW



TELEWRITER £9.50

A suite of programs comprising
Telewriter -Main editor
Teleflip -Displays up to 20 pages of data
Teleload -Allows inserts to other programs
Demo_Ten -Demonstrates 10 pages of data to play with
This is a powerful utility which gives the serious user easy domination over the BBC's extensive Mode 7 capabilities. Comprehensive manual.

NEW



SLIDER £8.50

This utility synchronises a single slide film projector with a pre-recorded tape commentary or music background. A slide projector with remote control is required. Programs allows up to 999 slides to be controlled for variable display times. Applications for lecturers, photographers, architects etc. and micro film users. Instruction manual.

All prices are full inclusive

AVAILABLE AT GOOD COMPUTER STORES OR DIRECT FROM PAEAN SYSTEMS

PAEAN are hunting for high quality, imaginative and exciting programs for the BBC or ELECTRON micro's to market in the UK and overseas. If you have written an original game, educational or beginners program which you believe has commercial potential send a cassette to PAEAN systems and if we agree with you we will offer you a contract. Dont forget to include your name, address and telephone number.

Still to be won; a £50 note for the first response which correctly interprets the written significance of the PAEAN logo.

BBC Model B
(any OS, Basic I/II)

£9.95
(inc. VAT and p.p.)

QUAL-SOFT "LEAGUE DIVISION ONE"

THE THINKING FAN'S SOCCER GAME

Are you a soccer supporter? How much do you **REALLY** know about the game? Can you take a side, newly promoted to Division 1, and build it into a genuine contender for the 1st Division Championship? Can you select the right tactics and team to hold Liverpool at Anfield, and the right ones to improve your goal difference at home to Wolves? Can you "read" a match well enough to see your own team's weaknesses, and then have you the skill to exploit the transfer market to cure them? In short: Would you make a successful 1st Division team manager?

WELL HERE'S YOUR CHANCE TO PROVE IT!

- * You have 5 seasons, 42 League matches/season.
- * Opposition: 21 of the 22 current 1st Division sides.
- * Each team has its own playing style and strengths.
- * Each team has home and away match tactics.
- * Define your own tactics. Tactics really work because:-
- * A true 90 min. match simulation, (3½ min. on your Beeb).
- * Graphics representation: How the match goes.
- * Realistic scoring, injuries, red and yellow cards.
- * Substitution and team adjustments for injuries.
- * Tactical substitution with repositioning of players.
- * Transfer market, real (devious) price bargaining.
- * League position, playing record updated after each match.
- * 25 to 30 hours for a game unless relegated.
- * Simple, quick SAVE/LOAD game facility.

CAN YOU GET YOUR TEAM'S NAME ON THE SILVERWARE?

QUAL-SOFT
Dept. CES
18, Hazelmere Rd.,
Stevenage,
Herts.
Tel: (0438) 721936

Please send me copie(s) of
LEAGUE DIVISION ONE.
I enclose cheque/postal order to the
value of £ or debit
my Access/American Express
Card No.

NAME:
ADDRESS:
.....
.....
SIGNATURE

Leigh Computer Systems

COMPUTERS

Sinclair 16K	£86.90
Sinclair 48K	£113.00
Dragon 32K	£145.00
Oric 48K	£113.00
Electron	£173.80
BBC 'B'	£346.95

EPROMS

Sideways ROM	
Board	£38.00
2764's (each) P.O.A.	
27128's (each) £15.50	
8271's P.O.A.	
(discount on volume)	

MONITORS

(all complete with lead)

Cabel 14" colour	£190.00
Microvitec 14" colour	£197.00
TV Monitor	£207

ACCESSORIES

Disc Interface	£78.50
Upgrade A — B	£57.00
Spectrum	
16K — 48K	£19.95
Joysticks	
(analogue)	£15.00
Joysticks	
(self-centring)	£16.50

PRINTERS

Alphacom 30	£51.00
Epsom RX80	£225.00
Epson RX80FT	£260.00
Epson FX80	£335.00
Shinwa CP80	£225.00
Star Gemini 10	£219
Star Delta 10	£325
Printer Cable	£8.50

CUMANA DISC DRIVES

Single 100K	£195.00
Twin 200K	£326.00

LARGE SELECTION OF SOFTWARE

— TOO MANY TO LIST

£1.25 off 2 pro-rata for over 2

SAE for lists — state machine

ADD 80p carriage — small items

£7.00 carriage — large items.

ADD 15% VAT to total

36 Derby Road, Hinckley, Leicestershire LE10 1QF.
Telephone: 0455 612139

Silverlind

SILVERLIND LTD. 156 Newton Road, Burton-on-Trent
Staffs. DE15 0TR. Tel (0283) 63987

TOWNTTEST

BBC/B

£6.50

A very useful aid for teaching Geography in primary schools, this program tests pupils' knowledge of the locations of major towns and cities in England, Scotland and Wales. Well presented, with a high-resolution map.

BIOLOGY

BBC/B

£12.50

A suite of programs using text, animated diagrams, examples, and questions to assist in the understanding of Biology to CSE, 'O' and 'A' Level standards. Most suited to individual use by students, these programs also contain material teachers can extract for classroom demonstration. Topics covered include the Eye, Ear, Heart, Blood and Circulation, Skeleton, Female reproduction, Genetics, Biochemistry and the Central Nervous System.

ENJOY MATHS

48K Spectrum

£8.00

A suite of 4 highly motivating programs for the 8 - 14 age range: tables, simple equations, polygons and areas. The programs combine explanation with tests and make good use of colour and sound.

MASTER DIET PLANNER

48K Spectrum

£11.95

The ultimate in diet programs, the MASTER DIET PLANNER contains details of calories, protein, vitamins and other nutrients for 681 foods! The MASTER DIET PLANNER will help you plan a well-balanced diet, including options to restrict fats, cholesterol and salt, or to increase fibre intake - at the same time offering maximum choice of foods. Instructions and Recipe Book included.

ALL PRICES INCLUDE POST & PACKING & VAT

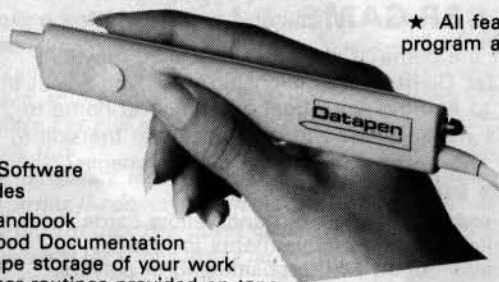
We require good programs to increase our catalogue and pay high royalty rates for published material.

A QUALITY LIGHT PEN for the BBC Micro

- ★ Absolutely insensitive to ambient lighting.
- ★ Responds to different colours and screen intensities without any adjustment of TV or monitor.
- ★ Red LED readout showing that data is available.

- ★ Switch for program control (allows pen to approach the screen without erroneous data capture)

- ★ All features are program accessible



Free Software includes

- ★ Handbook
- ★ Good Documentation
- ★ Tape storage of your work
- ★ User routines provided on tape and printout
- ★ 'Freehand' drawing program
- ★ 'Library menu' drawing program (define your own library of shapes)
- ★ Example programs illustrating uses of the pen and its features

£25

inclusive

Also available for VIC-20 and DRAGON microcomputers please state your computer type when ordering.

Send cheque or P.O. for £25 to:

Dept. MU1, Datapen Microtechnology Ltd., Kingsclere Road, Overton, Hants.

Please enclose SAE if requesting literature

Now also available from good dealers.

Datapen Microtechnology Limited

CompuSoft

CS1-TOCCATA Music with a difference! Almost 9 minutes worth of BACH complete with a stunning visual display showing the 'shape' of the music for only £2.99. Cassette.

CS2-BANDIT A one-arm bandit program for only £2.99. Why pay 2 or 3 times as much for a program that offers no more than this full feature version. Cassette £2.99.

CS3-NURSERY RHYMES One of our best sellers. Just for the young. Words, pictures and music of the old favourites Hickory Dickory Dock, Polly put the kettle on, See-Saw Margery Daw and Baa Baa Black Sheep. Cassette £2.99.

CS4-SPACE MISSION SIMULATOR A new concept in space games. This is not the usual blast-em out of the sky type of game with endless successions of mindless aliens. In SPACE MISSION SIMULATOR you have to first answer the call to scramble and then fuel, arm and take off your space fighter. Only then can you deal with the aliens. After destroying the alien attack wave your performance is assessed and marked. Cassette £3.99.

CS5-OPTICS A full 'O' level revision course. This suite of programs comprises 16 sections (89K of code) that take you through the 'O' level syllabus. These programs are copiously illustrated with Ray diagrams that show and demonstrate the rules and laws that need to be learnt. Cassette £9.99, 40 track disc £12.99.

CS6-KEYS A powerful programming aid. KEYS reserves the bottom two lines of the screen to provide a visual reminder of the function of the 6 sets of the 10 programmed function keys that this program provides. Each bank of function keys is very rapidly selectable and is grouped with similar functions kept together. Thus, for example, you will find MOVE, PLOT, VDU, GCOL, CLS, CLG and COLOUR all available together. This program is supplied on cassette and is programmed for use on both Tape and Disk based systems. £2.99 cassette.

CS7-SCREENPLAY Now you can control the shape of the music. SCREENPLAY allows you to preset the tempo, volume and vibrato of the music with the display colours, width, height and spacing set for any of the four selectable basic patterns. Alternatively if you wish you can let the computer choose a display pattern for you. Four Scott Joplin music files are provided: The Entertainer, Pine Apple Rag, Maple Leaf Rag and Solace. Cassette £4.99, 40 track disk £7.99.

All the above prices are inclusive of post and packing.

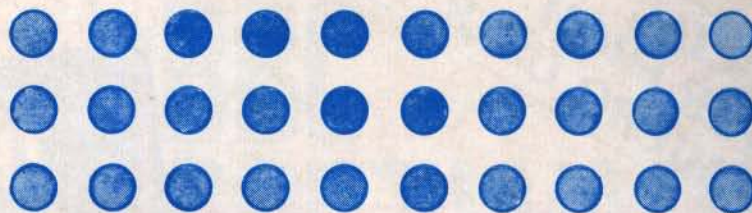
We pay much higher commission rates than the big companies. Why not let us review your latest program.

32 Watchyard Lane Formby
Liverpool L37 3JU

CompuSoft Ltd.,

computer market

CENTRAL NOTTINGHAM



MICRONET 800 MODEMS

MODEM 1000	£69.95
MODEM 2000	£84.95
BBC ROM COMMUNICATIONS PACK	£19.95
MICRONET 800 AND PRESTEL NOW ON DEMONSTRATION	
JOIN MICRONET 800 AT COMPUTER MARKET	

PRINTERS (£7 carriage)

SEIKOSHA GP100A	£205.00
EPSON RX80FT	£329.00
SEIKOSHA GP700A COLOUR PRINTER (7 colour text and hi-res graphic printer)	£430.00
SCREEN DUMP TO GP700A	£9.95
JUKI DAISYWHEEL	£429.00

PACE DISC DRIVES £7 carriage)

Compatible with all single and double density interfaces
Prices include cables and manual

100 K	£212.75
200 K	£270.25
The real AMCOM disc interface	£99.00

The NEW KENDA PROFESSIONAL double density interface (doubles the above disc capacities).

Features include up to 379 files/disc. Uses no

USER RAM, no hidden extras

(fitted free if drive & interface bought together)

JOYSTICKS (£1.00 p&p)

Add a PROGRAMMABLE INTERFACE (£9.95)
(allows even non joystick games to be played) with any of the following self centre joysticks

QUICKSHOT I (moulded grip with fire buttons on top and base)	£9.95
QUICKSHOT II (moulded grip with trigger and top mounted fire button)	£11.95
SUPERCAMP (Top Trigger fire button & 10 feet retractable cable)	£14.95
TAC-2 (the ultimate in smooth control)	£18.95

ROMS

WORDWISE	£46.00	AIDS PROGRAMMERS UTILITY	£16.50
VIEW	£59.00	TOOLSTAR (PACE)	£34.00
DISC DOCTOR	£33.25	COMMSTAR (PACE)	£34.00
GRAPHICS ROM	£32.25		

MONITORS

CABEL COLOUR MONITOR	£229.00
FIDELITY TV/MONITOR SUPERB QUALITY	£249.00
	(LEAD £5.00 EXTRA)
PHILIPS GREEN	£99.00
SANYO GREEN (with anti glare screen)	£129.00

BOOKS

The widest choice in the area. Over 30 BBC titles in stock.

SOFTWARE by ACORNSOFT, BUG BYTE, PROGRAM POWER, SUPERIOR, ALLIGATA PLUS OTHERS

— Over 100 different titles

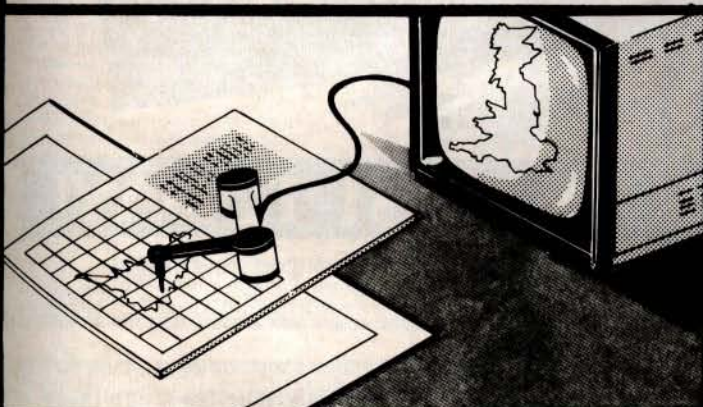
All prices include VAT.

27 GOOSE GATE. TEL: 0602 586454

Robot

Plotter

£59.50
INC. VAT
CARRIAGE
£3.00



COMMANDS FOR:

LINES
CIRCLES
RECTANGLES
INFILLING
COPY AND MOVE
PRINT AT
AS WELL AS TRACE MODE

- ★ FOR BBC MICRO MODEL B CASSETTE OR DISC
- ★ ENABLES PICTURES TO BE DRAWN OR TRACED
- ★ WORKS IN ANY GRAPHICS MODE — COLOUR SELECTABLE
- ★ DESIGNED BY A TEACHER FOR EDUCATIONAL USES BY STAFF AND PUPILS
- ★ TRANSPARENT TABLET ALLOWS DIAGRAMS AND MAPS, ETC. TO BE COPIED
- ★ ROUTINE INCLUDED TO SAVE QUICKLY TO DISC OR CASSETTE
- ★ SCREEN DUMPS FOR EPSON AND SEIKOSHA PRINTERS
- ★ TRIED AND TESTED — DIRECT FROM THE MANUFACTURER

Please send me

I enclose Cheque/P.O. for

or please debit my Access/Barclaycard

Name

Address Code

GOVERNMENT AND EDUCATIONAL ESTABLISHMENT
OFFICIAL ORDERS WELCOME

Robot

COMPUTER DEVELOPMENTS LIMITED

NATIONAL INDUSTRIAL ESTATE
BONTOFT AVENUE, HULL HU5 4HF
TEL: (0482) 448562.

**SPECIAL
OFFER FROM
THE MICRO USER**

The Advanced User Guide

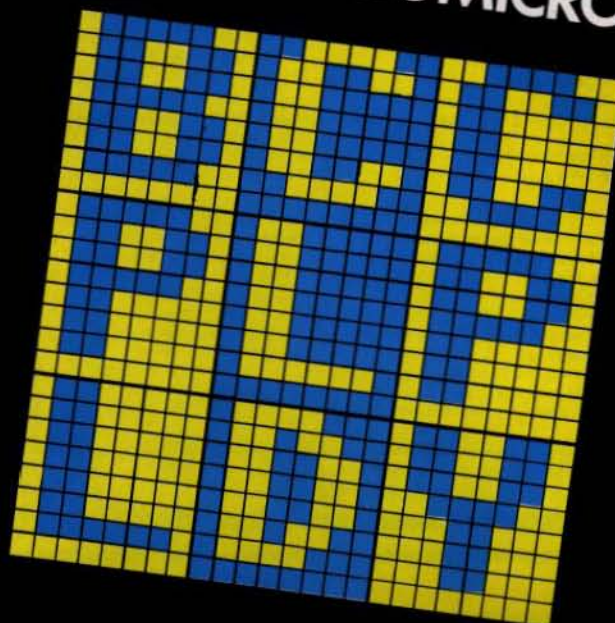
**The essential companion
for the BBC Micro.**

Featured in its 512
information packed pages
are

- ★ the BASIC Assembler
- ★ 6502 machine code
reference section
- ★ complete descriptions of
all FX calls
- ★ BBC memory usage and
vectors explained
- ★ full interfacing details for
the user port, tube,
analogue port, 1 MHz bus
- ★ paged ROMs explained
- ★ and lots, lots more

With many examples to
illustrate the text, this guide
is the indispensable
reference work for the
serious BBC micro
programmer.

THE ADVANCED USER GUIDE FOR THE BBC MICRO



BRAY, DICKENS & HOLMES

**ONLY
£12.95**
(plus p&p)

ORDER BY POST TODAY!

Please send me copies of The Advanced User Guide
at £13.95 (inc. p&p) TOTAL £

Name

Address

.....
.....
.....

Signed

Please indicate method of payment (✓)

- ☐ Cheque/PO made payable to
Database Publications Ltd.
- ☐ Access/Mastercharge/Eurocard
- ☐ Barclaycard/Visa
- ☐ American Express

Card No.

Expiry date

Send to: Micro User, FREEPOST,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.
(No stamp needed if posted in UK).

Or you can order by phone quoting
credit card number and expiry date.

061-480 0171

BBC Micro POOLS PREDICTOR

An easy to use, but very powerful Football Pools Prediction program for the BBC Micro. It combines six different techniques of forecasting based on a comprehensive analysis of current form. The program can easily be 'tuned', without any reprogramming, to improve forecasts as the season progresses. Also available for the 48K Spectrum.

£4.99

**MAYDAY
SOFTWARE**

181 PORTLAND CRESCENT
STANMORE, MIDDX HA7 1LR

SOFTWARE SERVICES

**ROMGAMES
PLUG 'EM IN - CALL 'EM UP!**



SPIDERS - fast action arcade game - kill the giant spiders before they trap you - full sound and hi-score ladder.
CAT & MOUSE - simply the best maze game ever (not like pacman) beat time, the cat and the machine - machine code action.

OTHELLO - full feature graphics strategy game against the computer.

Available on ROM **£9.95**

Available on DISC **£5.95**

Available on CASSETTE **£3.95**

"SECURITY" still available at **£15** from:

Dept. 1 Software Services, 65 South Mossley
Hill Road, Allerton, Liverpool L19 9BG.

Trade enquiries welcome

HARD COPY FOR LESS £'s!

Looking for a printer for listings, program development, etc. Look no further. Now you can use the ZX Printer with your BBC Micro by means of this new interface.

- ★ Built-in mains derived power supply.
- ★ Simply connects to the 1MHz Bus of the BBC Micro and the ZX Printer connector.
- ★ Full upper and lower ASCII characters.
- ★ Supplied complete with relocatable M/C software and full instructions.
- ★ Guaranteed 6 months.

Send cheque or P.O. for £29.95 or s.a.e. for further details.

£29.95
inc VAT, P&P

Dealer enquiries welcome.
Ideal for schools.
ZX Printers not supplied.

W.D. INTERFACES

12 Leabank Ave, Garforth, Leeds. LS25 2BL. Tel: Leeds 864328

DRIVE THE FLYING SCOTSMAN!

In our driver simulation game you can try to do just that.

Your task is to drive the Flying Scotsman from London. You must attempt to keep time despite some adverse conditions e.g.: Lineside Engineering works, signal checks and speed restrictions. If you fail to do so you may be relieved of the controls, or lose valuable points for the end of game performance rating.

You have a choice of three types of motive power, these being Deltic, Brush 47, and the H. S. T. varying from Ex-works condition to those due for attention.

Flying Scotsman for the B.B.C. 'B' is available from:-

DEE-KAY SYSTEMS

18, Salford Close, Woodrow South,
REDDITCH, Worcs, B98 7UN

Price **£7.50** inc. p&p.

BBC SOFTWARE

RICKSOFT

* Arcade Games * Adventures *
* Educational * Utilities * ROMS *
* Languages * and more

HIRE

WITH OPTION TO

BUY

Most from **£1**
per fortnight
With up to
25% discount

Membership **£10**

For catalogue and membership form send name
and address to

Ricksoft, Dept. L, 78, Warren Drive, Hornchurch,
Essex RM12 4QX.

Tel: (04024) 47722

WE CAN IMPROVE YOUR LANGUAGE

French, German, Russian, Spanish
by
CARSONDALE



Educational Programs of the Highest
Quality for the BBC Micro (32K)
supplied on cassette.
(Electron users: write for details)



● IRREGULAR/ESSENTIAL VERB SERIES

Thousands of verb forms at your finger tips for all abilities.

- ★ Choose your level
- ★ Attractive colour formats
- ★ Full foreign characters
- ★ Multiple ways of use
- ★ Full documentation
- ★ English meanings
- ★ Reference and browse
- ★ Test with time limit

A truly remarkable achievement which allows you to study all those
verb forms - an essential part of grammar.

IRREGULAR FRENCH VERBS: 150+ verbs, all non-compound tenses
ESSENTIAL FRENCH VERBS: 80+ verbs, 5 tenses, retest, save test
IRREGULAR GERMAN VERBS: 200+ verbs, 15 tenses!
RUSSIAN IRREGULAR VERBS: 150+ verbs, optional stress, aspects

£15.99
£9.95
£11.96
£17.49

● TEXT-FILL

In cooperation with D. Adshead, Birmingham University. Based on a
most effective teaching method, these superb programs are ideally
suited to the micro.

- ★ Highly addictive and effective
- ★ Upper and lower case foreign characters
- ★ 20 texts supplied
- ★ Enter your own texts, store them on tape or disc.

All prices
include VAT
Add 50p
p&p

Choose one of the supplied texts. It turns into hyphens and
punctuation marks! Choose how much you wish to see, and fill in
the blanks.

FRENCH TEXT-FILL: Also allows German and English texts
RUSSIAN TEXT-FILL: Includes 10 advanced texts
SPANISH TEXT-FILL: SAE for details.

£9.95
£11.96
NEW!

CARSONDALE ENTERPRISES LIMITED

44 Kingsway, Stoke-on-Trent, Staffs ST4 1JH.

Are you learning a foreign language?

POLYGLOT

This is one of the most sophisticated cassette tape based vocabulary learning systems yet devised for the BBC model B. The system records your test results with the vocabularies on tape, and keeps testing you on the words which you don't know, until you get them right. You may set up your own vocabularies, alter, delete or sort them.

Handles all accented letters and special characters needed for most West-European languages, including French, German, Italian, Spanish, Danish, Dutch, Finnish, Norwegian, Portuguese and Swedish.

Suitable for beginners and advanced students. Needs OS 1.2 & 32K. £9.95 for programs, sample vocabularies in English-French, and a comprehensive ten page instruction booklet.

LEIGHTON EDUCATIONAL SOFTWARE

Woodlands, Heath Park Road, Leighton Buzzard,
Bedfordshire, LU7 8BB.

J.P. MAGNETICS LIMITED

HAVING TROUBLE OBTAINING QUALITY
COMPUTER LENGTH CASSETTES?

WE CAN SOLVE YOUR PROBLEM

10 x C15 for £4.50 + 50p P&P
(CASH WITH ORDER)

We are specialists in the supply of bulk custom
wound audio/computer cassettes.

Trade and Educational Enquiries Welcome.

Competitive Rates - Price List Available.

Contact us now: (0274) 731651

Unit 4, - 7 Mary Street, Bradford, BD4 8SW.

RUNESMITH for BBC (32K) Micro

An adventure with a difference. Alter the story. Or guess
what the gaps are made of. Achieve a Runesmith grade.

Be a magus with words. Load in the text provided,
which is science fiction, erotic, metaphysical, written by
Alan Marshfield: WYCH HAZEL ON THE PLANET
TERROR. Or feed in your own text.

RUNESMITH is as flexible as your imagination. An
adventure of the mind full of spice and invention. A tool
for creative copy. An education.

The program RUNESMITH comes complete with WYCH
HAZEL text files and 14 pages of documentation. Send
£9.50 cheque or PO for complete RUNESMITH package.

ABRAXAS SOFTWARE, 13 Copthall Gardens,
London NW7 2NG.

DISC DRIVE OWNERS!

Now is the time to use your expensive disc drives as something other
than a very fast program loader.
DISC-DATABASE is a disc based filing system suitable for everyone.
By using true RANDOM ACCESS FILING you are no longer confined to
programs/data being a mere 32K.

Facilities include:-

* The creation of your own tailor made database. * Define your own
screen layout. * Search by any field. * Search by full or part field
references. * Find, Display, Amend or Delete any record. * Define your
own print out summary.

The detailed manual supplied also shows how you can write and build
into the main program your own additional routines which will not only
enhance DISC-DATABASE but also help you learn how to get more
from your disc drives.

Supplied on 40 track disc, complete with a comprehensive manual.
Suitable for BBC Model B (Basic 2) with single or double disc drive.

£11.50 including VAT. Cheque or P.O. to:-

S & B SOFTWARE

54 Wychwood Road, Wolds View, Bingham, Nottingham. NG13
8SB.

PLINTHS

Safely support your TV/Monitor or
Printer above your micro with this
sturdy mild steel plinth, your micro
slides easily underneath when not in
use, Disc Drives/Cassettes or general
storage at the sides, a very useful
addition to any micro user. Attractive
texture finish in black or BBC colour
match.

ONLY £28.75 Inc. VAT + £3.75 p&p

Trade Enquiries welcome - Allow 28 days delivery

J & W BUNCE

Unit 3, Crabtree Road, Thorpe Industrial Estate
Egham, Surrey TW20 8RN
Tel: (0784) 33556

TOP QUALITY PRINTERS! ROCK BOTTOM PRICES!

EPSON RX80	£219 + VAT	SHINWA CP80	£189 + VAT
EPSON RX80F/T	£248 + VAT	JUKI 6100 Daisy-	
EPSON FX80	£328 + VAT	wheel	£328 + VAT
EPSON MX100	£378 + VAT	STAR DP515	£198 + VAT
EPSON FX100	£438 + VAT	GEMINI 10X	£198 + VAT



CUMANA DISK DRIVES

from £198 + VAT

We also have large stocks of sundries, etc.

For FREE BROCHURE and DISCOUNT ORDER

FORM write now to:

Datatech Ltd (TMU)

8 Bellingham Close, Bury, Lancs. BL8 2TU.

Tel: 061-764 5579

'KILLA' THE UPGRADE

by S.D. Ellington From: BIT TWIDDLERS

If you **already own** the popular game of Killer Gorilla for the
BBC Micro then 'Killa' will provide:

1. 15 levels of play.
2. Variable extended jump.
3. Climb and jump with hammer.
4. Extra lives after 25, 50 & 75 metres.
5. Practice mode.
6. Pause facility.

Start practice session at 'any height', 'any level'. Exercise your
new powers and discover new routes. Have a go at the higher
levels with a fighting chance.

Written by a professional programmer.

£2.75 + 50p p&p

BIT TWIDDLERS Dept MU/3,

For disc compatible cassette
by 1st class return post.

158 Church End,
Harlow, Essex,
CM19 5PF.

Now available on Micronet and from discerning shops

ALL IN
STOCK

S.P. ELECTRONICS

BBC
SPECIALISTS

Acorn Electron (phone for availability)	£199
BBC Model B 1.2 O.S.	£399
CP80 Printer + DELTA (inc. cable)	£249
Disc Operating System	£85
Disc Drives	from £199
Disc Operating System D/Density	£91.00
G3 WHO RTTY PROGRAM (TAPE)	£7.50
G3 WHO RTTY PROGRAM (EPROM VERSION)	£20.00
Circuit board for RTTY decoder (inc. instructions)	£6.30
Star Delta 10X Printer (inc. cable)	£299.00
Joysticks (pair) self centering + analogue	from £16.00
Printer Cable (Centronics)	£12.90
Speech Synthesis	£55.00
Disc Doctor	£33.00
WORDWISE Word Processor	£39.00

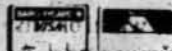
Wide selection of software: books, leads, plugs, etc.

SAE for full list. All available Mail Order

48 Linby Road, Hucknall,

Notts. NG15 7TS.

Tel: 0602 640377



(all prices include VAT)

Carriage
extra

MUSICSOFT

MUSIC SPECIALISTS FOR THE 32K BBC MICRO

★ THE SYNTH ★ (O.S. 1.0+)

"A very flexible and inventive program that's highly recommendable." (Dr David Ellis, E&MM, Oct 83)

This 'synthesizer' program has features which to our knowledge are unique.

* ALTER RHYTHM. The rhythm of a recorded melody may be altered by tapping on a single key.

* REPEAT. No need to play a phrase twice, great saving in space.

* REAL TIME PLAYING. With alteration of volume, envelope and octave pitch as you play a note.

* EDITING. Back and forwards whilst hearing the tune.

* INPUT. May be hesitant or in correct time.

* TIDY. 'Cleans up' inaccuracies of input on demand!

* NUMBER OF NOTES. From 3000 for 1 channel to 1000 for 3, etc. Plus all that the other synthesizer programs do PLUS, 16 sophisticated envelope editing (very easy), larger keyboard used (TAB to ↓ cursor). No secrets, user transparent.

* This is the program for the experimenter who wants to make HUMAN music rather than perform mathematical finger dexterity exercises.

THE SYNTH. Cassette & instructions only £8.75 inc. P&P.



★ KEYBOARDS ★ (O.S. 1.0+)

5 programs to turn your BBC into 5 real-time keyboards. 1. 3 simultaneous voices (in Basic for easy understanding) 2. Single voice M/C with Pitch Bend. 3. 3 simultaneous voice M/C with Envelope control built in. 4. Single finger Chord organ ranging over the whole keyboard, 2 variations for each chord. 5. Chord organ 2 with different chord configuration. These are all separate programs designed for you to use as they are or in your own programs.

KEYBOARDS cassette & instructions £5.75 inc. P&P

★ MUSICTOOLS ★ (all O.S.)

"Musicsoft also produce an excellent 'Musictools 1' cassette... all in all, rather good value" (E&MM, Oct 83)

Five music utility programs on one tape.

Tune Generator with dynamic graphic Keyboard & Stave display, Envelope Command Explorer (Very easy to use), Musical Symbols Graphic routine, Simple single line organ with sophisticated controls. Over 60 procedures for you to use in your programs already in working programs.

MUSICTOOLS 1 cassette & instructions £5.75 inc. P&P.

★ PIEMAN ★ (all O.S.)

"The best version of Simon I've seen, it goes so much further than most" (Quote by a rival software firm!) Recommended for Primary & Middle Schools. Not as simple as Simon! It develops into a fun set of ear cleaning and musical concentration games - from easy at infant level to impossible at graduation! Auto scoring.

PIEMAN cassette & instructions £5.75 inc. P&P.

ALL PROGRAMS TRANSFER EASILY TO DISC.

Cheques and official orders to:

MUSICSOFT, 12 Fallowfield, Amthill, Beds.

Telephone: 0525 402701

If you require further information, please send S.A.E.



GARLAND COMPUTING

35 DEAN HILL - PLYMOUTH - PL9 9AF. TELEPHONE: 0752 41287

NEW BBC RELEASES

LEARNING MATHS A series of programs for ages 9-12. Each package contains 3 to 4 programs, many with animations and entertaining games to help learn the principles of maths in school or at home. (Each Package £7.00)

Angles . Directed Numbers . Fractions . Co-ordinates and Lines . Symmetry . Motion Geometry . Sets . Elementary Statistics . Ratios

MUSIC TUTOR A unique and absorbing program which helps you to learn or create music. Notes can be entered in various ways, and the pitch and duration displayed on the screen on a treble clef. Other options allow you to play back, alter, make permanent copy and more. Full documentation (£10.95)

EDUCATIONAL GAMES Three programs which will provide fun for all the family and help to improve children's spelling, concentration or ability to estimate angles and distances. (Each £5.95)

Wordsquare . Pick-A-Pair . Sea-Battle

Prices include VAT and P&P. Available by mail order, or from selected computer stores and educational suppliers. Send for full details of our extensive range of educational software.

THE EDUCATIONAL SPECIALISTS

35 DEAN HILL . PLYMOUTH . PL9 9AF

TELEPHONE 0752 41287

Make music with ...



Write your own compositions for the BBC microcomputer.

- full GRAPHIC display showing treble and bass staves
- VERSATILE SCREEN EDITOR with single key input
- up to 1200 note compositions on tape (600 on disc)
- SAVE your music/sound effects on disc or tape
- write in ANY KEY; sharps and flats are put in automatically
- up to 3 VOICES
- redefine up to 16 ENVELOPES
- HEAR the notes as you enter them
- completely compatible with the ENVELOPE GENERATOR program
- FULL DOCUMENTATION in USERS GUIDE
- PLAYBACK any tune/sound effect IN YOUR OWN PROGRAMS

32K required disc or tape OS 1.0 and above

£9.00 incl. vat

SYSTEM SOFTWARE

envelope generator

Create your own sound effects. Envelope Generator guides you through sound creation on the BBC microcomputer.

- interfaces directly with MUSIC EDITOR
- 16 special envelopes already defined
- SAVE envelopes for use in ANY program
- easy to use SCREEN EDITOR
- ACCURATE and matched amplitude and frequency graphs
- PRINTS both ENVELOPE and SOUND statements
- Hear the sound immediately
- step-by-step instruction in full USERS GUIDE

32K required disc or tape OS 1.0 and above

£7.00 incl. vat

Cash with order
(Please specify disc or tape)

SYSTEM

Dept P3 12 Collegiate Crescent, Sheffield S10 2BA

LANGUAGE LEARNING AIDS FOR FRENCH, GERMAN & SPANISH

Already in use in numerous schools and colleges, these programs provide an immensely powerful aid to foreign language learning. The cassettes include extensive vocabulary lists arranged as a series of lessons, each covering a different subject. A tuition control program enables individual lessons to be loaded and used as required.

Words, phrases etc are presented first in one language, then the other complete with all necessary accents and special

characters. Masculine, feminine and neuter words appear in different colours to encourage gender learning. All lessons can be run in three different ways, i.e. learning only, self-test or speed and accuracy test.

The programs are suitable for pupils of all ages as simple commands enable new lessons in vocabulary or grammar to be entered by the user. These may then be edited as required and stored on cassette for later use. Invaluable for homework and exam revision!

Level A Cassettes: Contain the tuition control program and 16 comprehensive lessons for general vocabulary learning.

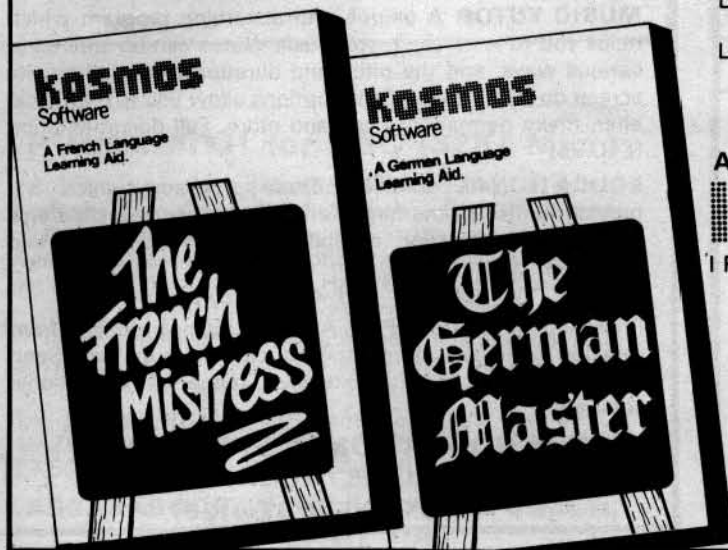
Level B Cassettes: Contain the tuition control program and 16 lessons including verb lists, adjectives, adverbs and phrases.

Available from dealers, large stores or mail order.

Also Available "THE SPANISH TUTOR"

Kosmos Software

1 Pilgrims Close, Harlington, Dunstable, Beds. LU5 6LX Tel: 05255 3942



Kosmos Software, 1 Pilgrims' Close, Harlington, Dunstable, Beds LU5 6LX.

Please supply the following programs for the computer (BBC/SPECTRUM) (Prices include postage & packing)

B2

The French Mistress Level A @ £9.95 ☐ The French Mistress Level B @ £9.95 ☐
The German Master Level A @ £9.95 ☐ The German Master Level B @ £9.95 ☐
The Spanish Tutor Level A @ £9.95 ☐ The Spanish Tutor Level B @ £9.95 ☐

Mr/Mrs/Miss.....

Address.....

Post code.....

I enclose a cheque/postal order value £.....

payable to Kosmos Software

TWO WAYS TO ENSURE YOU GET

THE MICRO USER

EVERY MONTH

1. Complete and mail subscription form on Page 169
2. Hand this form to your newsagent.

Please reserve me a copy of The Micro User magazine every month until further notice.

☐ I will collect

☐ I would like it delivered to my home.

Name.....

Address.....

Note to newsagent: The Micro User should be obtainable from your local wholesaler, or contact the distributor - Wells, Gardner, Darton & Co Ltd Tel: Faygate 444

UROM

FOR THE BBC MICRO

UROM is a utilities chip containing a number of useful routines in an 8K EPROM. It can be fitted to your machine in minutes and contains the following facilities:

**** MEMORY DISPLAY.** Display hex and ASCII equivalents of any section of memory. Page forward and back. Change bytes. Dump to printer.

**** DISASSEMBLER.** 6502 mnemonics, hex and ASCII equivalents. Page forward. Dump to printer.

**** BLOCK MOVE.** Shift any section of memory to a new location in RAM.

**** FIND AND REPLACE.** Find all references to BASIC variable or constant and give lines at which it occurs. Replace it with another, larger or smaller.

**** DISPLAY USER KEYS.** The contents of the 16 user-definable keys are displayed.

**** SET UP KEYS.** The keys are set up with commonly used functions.

**** EDIT ENVELOPE.** Edit any of the envelope parameters quickly and easily. The new envelope is stored and may be played by pressing one key. Edit the corresponding 'SOUND' statement. A further utility displays the BASIC 'ENVELOPE' statement.

**** DEFINE CHARACTER.** Quickly edit a single character in the ASCII range 224-255. The BASIC 'VDU 23' statement is given.

**** CURE 'BAD PROGRAM'.** Restore a bad or corrupted program to the point where it can be listed and edited. Works on 'unlistable' programs, too.

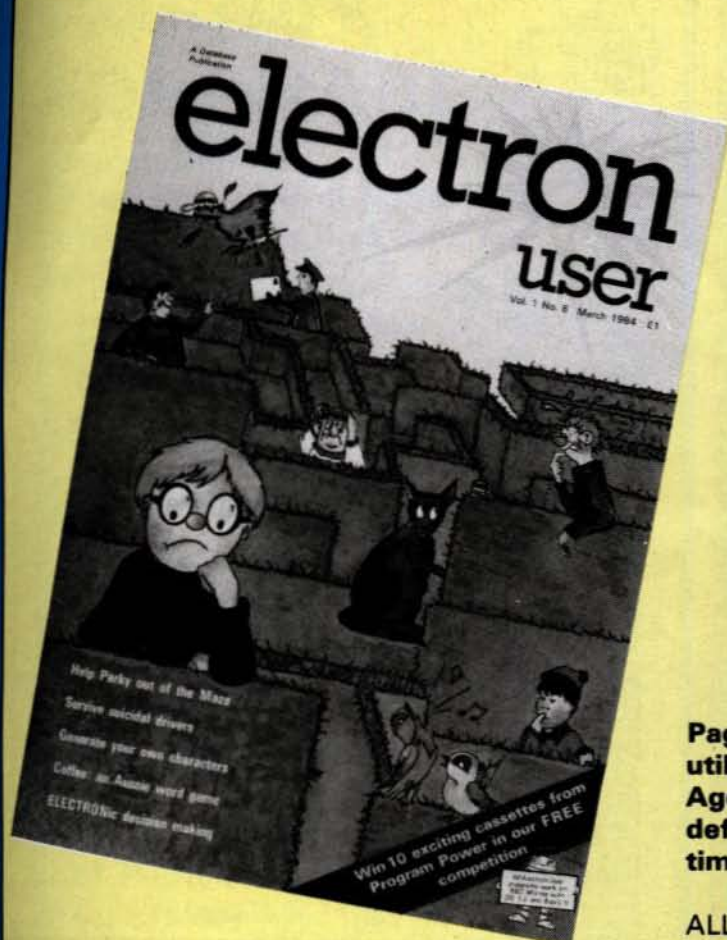
**** 6502 MONITOR.** Display registers, stack, flags, current instruction and up to 8 selected memory locations. Continue execution to BRK, single step, skip instruction, set P-counter.

**** STRING SEARCH.** Locate all references to a character or hex string in RAM.

Available now. Price includes full instructions, VAT and postage.

PRICE £19.95

J & H SOFTWARE, "The Elms", Sussex Road, Southport. PR9 0SJ.



Why should readers of The Micro User also subscribe to Electron User?

The answer's simple ...
LISTINGS!

Pages and pages of them. Games, graphics, utilities – plus regular features like Casting Agency and Sounds Exciting – all clearly defined to ensure you key in correctly first time.

ALL Electron User listings have been written so that they will also work without modification on a BBC Micro with OS 1.2 and Basic II.

If you have OS 1.2 with Basic I you may have to substitute certain semi-colons for commas. And if you have OS 1.0 or 0.1, you will find nearly all the programs will run without modification.

In the March issue you'll find action games, maze games, word games – in fact, all sorts of games! There's a character generator utility, graphics demonstrations, fast circles, a decision taker and lots more. And they all work on the BBC Micro!



You should be able to get Electron User through your newsagent. But to make sure you do get a copy each month fill in the subscription form below.

SPECIAL OFFER!

FREE cassette of 26 programs from the first four issues of Electron User
– worth £3.75
– order NOW!

SUBSCRIPTION FORM – Please send me the next 12 issues of Electron User at the special introductory offer inclusive price of £12. Special offer applies to UK readers only.

Name _____ Address _____ Card No. _____ Expiry Date _____

Signed _____ Payment: please indicate method (✓)
☐ Access/Mastercard/Visa
☐ Barclaycard/Visa
☐ Cheque/P.O. made payable to Database Publications

Send to: Database Publications, FREEPOST, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. No stamp needed if posted in UK.

northern computers

micro computer systems for all applications

we supply, support, location:

and service:
LISA
IBM
Apple II, III.
Torch
Acorn Electron
Acorn Econet
Fibre-Optic
Networks
Newbrain
Sinclair
B.B.C. Computers.

TRAINING SOFTWARE
SUPPORT - CAL primary
and middle school,
graphics design,
programming, accounts
training packages,
professional accounts,
e.g. - legal,
estate agents etc.

Visitors are invited to evaluate and test LISA, and B.B.C. econet.
please contact: GARETH LITTLER or MARK HOWARD

EDUCATION & TRAINING DIVISION.

Northern Computers, Churchfield Road,
FRODSHAM, CHESHIRE WA6 6RD Tel: (0928) 35110



ADMINISTRATIVE SOFTWARE
SUPPORT - Timetabling and
options, database records and
filing packages, word processing,
accounts.

ADVERTISERS INDEX

A & F Software	144	Leighton Educational	184
A.M.S.	111	Level 9 Computing	62
Aardvark	80	M.R.M. Software	26
Abraxas Software	184	M.W. Systems	98
Acornsoft	16, 17, 143	Mail Order Micros	92
Advanced Digital Systems	51	Mayday Software	183
Advanced User Guide	182	Micro User Show	120, 121
Alligata Software	130	Microage Electronics	24, 25
B.R.A. Joynes	188	Microaid	173
BBC% Club	84	Microbyte Software	75
BBC Microcomputer System	119	Micronet 800	56
Bit Twiddlers	184	Micropower	15, 23, 31, 63, 157, 192
Bridge Software	190	MicroPulse	161
C-Tech	38	Microtraffic Systems	32
C.C.S.	156	Microvitec	49
C.M.S.	140	Microworld	126
Cambridge Computer Consultants	37	Micro/TV Adaptor	148
Cambridge Computer Store	190	Midwich Computers	39
Carson Developments	92	Multiplex Computers	185
Carsondale Enterprises	183	Musisoft	136, 137
Chase Data	91	N.M.C.	140
Clare Micro Supplies	28	Nikam Electronics	161, 188
Commotion	171	Northern Computers	75
CompuSoft	180	O.I.C.	71
Computer City	191	Oakleaf Computers	74, 162
Computer Concepts	2, 22, 165	Opus Supplies	54, 61, 94
Computerama	3	P & H Electronics	7
Computermarket	181	Pace	95
Computertown	128, 129	Paen Systems	179
Contex	148	Park Software	155
Cortex Computers	172	Primasoft	156
Cumana	103, 112	Printerland	61
D.A. Computers	140	Pison Software	179
D.R.G.	11	Qual-Soft	146
Datapen	180	R.D. Laboratories	67
Dataplus	27	Redshift	148
Datatech	184	Remedian	183
Dataware	190	Ricksoft	181
Dedicated Microprocessors	60	Robot Computer Developments	184
Dee-Kay Systems	183	S & B Software	184
Doctor Soft	58	S.P. Electronics	172
Dynabyte Software	174	Silent Computers	180
Ebley Micro Peripherals	189	Silverlind	72
Electronique	20, 21	Simon W Hessel	147
Everyday Electronics	156	Simonssoft	158
Fairmorn Recording	188	Sir Computers	174
G.C.C. (Cambridge)	139	Softsmith	50
G.S.L.	30, 90	Softspot	135
Garland Computing	185	Software for All	18
Gemini	12	Software Invasion	183
Golem	190	Software Services	68
H & H Software	150	Software Supermarket	13
H.C.R. Electronics	148	Swift Machine	185
Home & Business	14	System	8, 9, 10
Hornby Software	189	Technomatic	60
Imagine Software	170	Tekform	29
Integrex	167	Twiststar Computers	106
International Video Game Comp	19	Universal	87, 100, 101
J & H Software	186	Viglen	114
J & W Bunce	184	Voltmace	183
J.P. Magnetics	184	W.D. Interfaces	172
John Wiley & Sons	149	Walrus	155
Jonsoft	171	Warex Soft	42, 43, 44, 45, 46
K.N. Developments	92	Watford Electronics	147
Kansas City Systems	138	Wordsworth, Ian Copestake	
Kay-Ess Computer Products	186		
Kosmos	180		
Leigh Computers			

BJSOFTWARE FOR THE BBC MICRO Home Accounts & Mail Order Club Controller

Use its 150 Bank/Customer Accounts & 25 Standing Orders to control your household incomings & outgoings, or a Mail Order Catalogue Club's finances.

Turn to Page 1 for Receipts, 2 & 3 for Paying out & Standing Orders, 4 & 5 for Transfers & Setting up accounts. Page 0 files your Data for next time.

Page A turns the Computer into a Calculator, and 6, 7, 8 & 9 Display the Bank/Customer Accounts, a full List of Transactions sorted by date just like your bank Statement, the 15 Controlled Accounts (to keep a close eye on chosen items of expenditure like a Budget Account) & a "Profit & Loss" statement for each month.

All pages show the date & amount of memory left, the Display Pages appropriately use green or minus red figures, & the Epson routine provides Hard copy when P is pressed.

Full error check and well documented, with a 300 Baud Back up copy to ensure easy loading, a very user-friendly and useful program indeed.

£6.00 to B.R.A. Joynes,
26 Fore Hill Ave, Bessacarr, Doncaster, DN4 7EU

AMPEX 120 US FERRIC BLANK CASSETTES

The ultimate ferric tape

C5 Quantity	1-9	35p
	10-24	33p
	25-49	25p
C10 Quantity	1-9	39p
	10-24	37p
	25-49	28p
C15 Quantity	1-9	46p
	10-24	44p
	24-49	33p

Carriage 1-9 50p - 10-24 £1 - 24-49 £1.50

FAIRMORN RECORDING
4 RECTORY LANE, BIRMINGHAM B36 9DH
021-747 3837

GAMES WANTED

"Everyone has got at least one novel inside him, and every BBC Micro owner has at least one original game waiting to be programmed." - **Zen in the Art of**

Computer Programming.

So says our editor in his forthcoming book. Is he correct though? Have you got a games program locked away in your subconscious, just waiting to see the light of day?

If so, get in touch with us right away - we're only too willing to hear from you. And we've got our team of experts ready to help evaluate your work and add any necessary finishing touches.

Of course, if it's good enough, we shall want to include it in the pages of BBC Micro User. So send a copy of your original games program, on cassette or disc, to:

The Editor, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport.

And please mark your envelope clearly "GAME".

HORNBY SOFTWARE



**Britain's top
Spectrum Pro-Golf Series now
available for the first time on
BBC Model B 1.2 O.S.**

The real thing, exact simulation of Britain's top golf courses.

1. All golf rules apply.
2. Designed for one or two players.
3. Played off any handicap.
4. On each hole, distance, par, green enlargement.
5. Control shot - choice of all clubs, strength, direction.
6. Graphics excellent.
7. Extremely realistic.

**TROON £7.75 NEWBIRKDALE £7.75
WENTWORTH EAST & WEST COURSE £11.00**

All prices include VAT & P&P

Available from:

**HORNBY SOFTWARE
21 Pinfold Hill, Leeds LS15 0PW.
Telephone: 0937 65847**

EBLEY MICRO PERIPHERALS

**LOOK! Best yet sideways ROM Board
Produced 16 ROM Sockets - Can be mounted
inside or outside BEEB or available in own case.**

Prices from £39.95 full details on request.

COMPUTERS

BBC Model 'B' £346.95
BBC Model 'B' with Disc Interface £407.80

PRINTERS

4 Colour Printer Plotter £108.50
CP 80 Type I £194.00
Star Gemini - 10X £205.00
Star Gemini - 15X £335.00
Star Delta - 10 £335.00
Riteman £220.00

DAISYWHEEL PRINTERS

Daisystep 2000 £270.00
Juki - 6100 £399.00

DISC DRIVES

Cased with power supply, cables and manual
40 Tk S-S 100k £188.00
80 Tk D-S 400k £282.00
Twin 80 Tk D-S 800k £528.00
Bare drives available from £125.00

MONITORS

Colour Carol CE 370A £190.00
SCM 14 N £197.50
Mono - from £66.00

Add carriage and VAT to all prices
Carriage - Printers, Disc Drives, Monitors and Computers £7
Rom Boards £1

EBLEY MICRO PERIPHERALS

**191/193 Westward Road, Ebley, Stroud,
Glos. GL5 4SX
Telephone (04536) 79446**

Teachers!

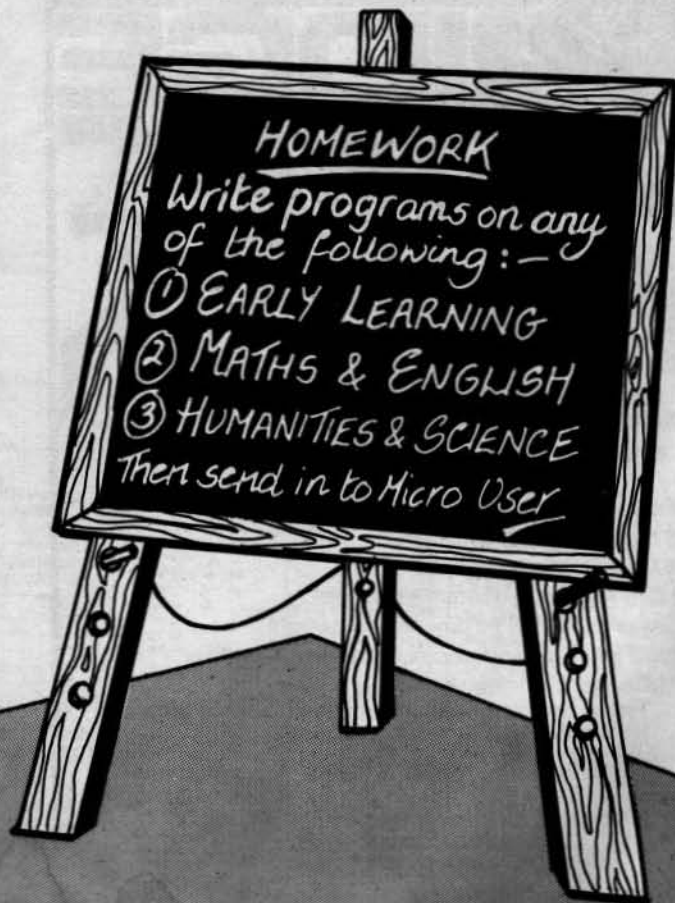
Don't confine your great ideas to your own classroom. Why not share them with your colleagues through the pages of *The Micro User*?

Each month from now on we'll be devoting articles to the use of the BBC Micro in education. As you can see, we've started in this issue with Ian Murray's article on user-friendly software and the excellent number balance program.

And our educational coverage won't be just pious theory - we'll be carrying programs you can try out in your own classroom.

To do all this, we're going to need your help. We need your programs, ideas and opinions. Why not send them to us at:

*Classroom Corner
The Micro User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.*



BBC/ELECTRON SOFTWARE

QUALITY SOFTWARE PRODUCED BY
PROFESSIONALS.

EDUCATIONAL

Our educational software is used in hundreds of schools and homes throughout Great Britain.

EDUCATIONAL 1 BBC/ELECTRON £8.00

Hours of fun and learning for children aged 5 to 9 years. Animated graphics will encourage children to enjoy maths, spelling and telling the time. The tape includes MATH1, MATH2, CUBECOUNT, SHAPES, SPELL and CLOCK.

... An excellent mixture of games, offering various levels of difficulty and speed of responses. Entertaining enough to keep young children's attention and, on the whole, well-designed enough to help them learn while enjoying themselves ... Personal Software - Autumn 1983.

EDUCATIONAL 2 BBC/ELECTRON £8.00

Although similar to Educational 1 this tape is more advanced and aimed at 7 to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY, CUBECOUNT and SPELL.

FUN WITH WORDS BBC/ELECTRON £8.00

Start your fun with alphabet puzzle in GUESS A LETTER. Continue your play as you learn about VOWELS, know the difference between THERE and THEIR and have games with SUFFIXES. After working so hard reward yourself with games of HANGMAN.

*** SPECIAL OFFER *** BUY ALL 3 CASSETTES AND DEDUCT £4.00

Add 50p per order for postage and packing.

Cheque/P.O. to:

**GOLEM Ltd, Dept B,
77 Qualitas, Bracknell, Berks, RG12 4QG.
Telephone: (0344) 50720**

For full catalogue giving details of games and utilities software for the BBC/ELECTRON apply to the above address.

SPELLWISE

IS YORE SPELING REELY ATROSHUS?

Or is it just a littel bit off kei?

In either case you need

SPELLWISE.

NOW ON
DISC
AND TAPE

- * is a spelling checker for use with your BBC micro and WORDWISE word processor
- * is a DISC or tape based machine code program with comprehensive user manuals
- * contains an expandable dictionary of over 6000 words (disc) or 3000 words (tape)

SPELLWISE diligently checks every word in your text against the SPELLWISE dictionary. When it has finished you will be left with a list of words which are incorrectly spelt or not in the base vocabulary.

The program can be interrupted at any stage for inspection of the remaining word list and for the insertion of personal or specialist vocabularies. For this purpose software is included to enable you to create your own data files.

SPELLWISE comprises a set of one disc (or two tapes) plus a complete user manual. The tape version is limited to cassette recorders with motor control. SPELLWISE costs £12 on tape, £18 on disc and can be obtained from:-

DATAWARE FREEPOST SWINDON SN3 4BR

BRIDGE SOFTWARE

THE NIGHT SKY (for BBC micro Model B)

An observer's guide to the stars
visible from anywhere between 66°N and 66°S
Discover the fascination of the limitless heavens.

Create brilliant hi-res starcharts with
THE NIGHT SKY and your BBC micro

- Features over 1000 different stars
- 5 magnitudes distinguished
- 87 constellations identifiable
- Many millions of different skiescapes
- Sky colour indicates day, night or twilight
- Ideal for serious astronomers and novices alike
- Make your TV screen a mini planetarium

**Trace the movements of the constellations
minute by minute, night by night**

Send £9.90 for cassette and Manual

Send s.a.e. for full list of our scientific
educational, graphics and games software for
Spectrum, ZX81 and BBC micro
Full money back guarantee.

Trade enquiries welcome

Dept BU, 36 Fernwood, Marple Bridge,
Stockport, Cheshire, SK6 5BE, England.



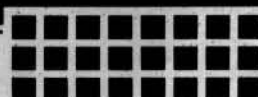
4

Emmanuel St.

**Our new Personal
Computer Centre
specializing in
the BBC Micro
with complete support**

we know computers

**1 Business &
Professional**
Tel: 0223 65335/4



**Home &
Educational**
Tel: 0223 358264

4

Cambridge Computer Store

1 & 4 Emmanuel Street, Cambridge

COMPUTER CITY

THE COMPUTER CAPITAL OF THE NORTH

78 VICTORIA ROAD, WIDNES, CHESHIRE. 051-420 3333

MISCELLANEOUS

Amcom DFS	£95.00
Acorn DFS	£89.00
L-DOS	£90.85
Speech Synthesis	£55.00
BBC Joystick	£16.95
Quickshot	£19.95
Lidytrom Recorder	£29.95
DR101 Recorder	£44.85
Light Pen	£27.00
ATPL ROM Board	£44.85
Parallel Cable	£11.00
Serial Cable	£11.00
Listing Paper (2000)	£13.00

Dust Covers from	£4.95
Disk Box (40)	£19.40
Disk Box (80)	£27.90
Prong Interface (Joystick)	£14.95

MONITORS

Cable 14"	£229.00
Microvitec 14" M1431	£245.00
Microvitec 14" M1451	£273.00
Microvitec 14" M1441	£306.00
Sanyo green	£110.00
BMC green	£125.00

SINGLE DRIVES

Single Sided 40 Track (100k)	£212.75
Double Sided 40 Track (200k)	£270.25
Double Sided 40/80 Track (400k)	£350.75
Double Sided 80 Track Only (400k)	£327.75
Single Sided 40/80 Track (200k)	£270.25
LVL Single (100k)	£265.00

DOUBLE DRIVES

Single Sided 40 Track (200k)	£388.70
Double Sided 40 Track (400k)	£516.35
Double Sided 40/80 Track (800k)	£665.85
Double Sided 80 Track Only (800k)	£618.70
Single Sided 40/80 Track (400k)	£516.35
LVL Double (200k)	£389.00

ROM SOFTWARE

Wordwise	£44.85
Beebcalc	£39.00
Disc Doctor	£33.85
Gremlin	£33.85
View	£59.00
Aid	£28.00
Pace DFS	£34.45
Gemini Database	£39.95
BBC HARDWARE	
Electron	£199.00
BBC Model B	£399.00
BBC Model B/DFS	£469.00
Teletext receiver	£225.00

PRINTERS

Seikosha GP100	£199.95
Seikosha 250X	£249.95
Star DPS10	£280.00
Shinwa CP80	£270.00*
Epson RX80	£310.00
Epson RX80F/T	£340.00
Epson FX80	£430.00
Juki 6100	£435.00
Smith Corona	£395.00
* Star Buy	
P&P on Hardware	£5.00

NEW FELLIX THE FACTORY

NEW Felix and the Fruit Monster	£7.99
Moonrider(B)	£7.99
Swoop(B)	£7.99
Galactic Commander (B)	£7.99
Timetrek(B)	£7.99
LaserCommand(B)	£7.99
Constellation(B)	£6.85
KillerGorilla(B)	£7.99
Croaker(B)	£7.99
Chess(B)	£7.99
Adventure	£7.99
Painter(B)	£6.85
CowboyShootout(B)	£6.85
MoonBaseAlpha	£7.99
DangerUXB	£7.99
Draw	£10.30
Where	£6.85
Chemistry	£6.85
WorldGeography	£6.85
JuniorMathsPack	£6.85
NEW Hell Driver	£7.99
Martian Attack	£7.99

- SPECIAL OFFER -
£1.00 off 2 Cassettes
£2.00 off 3 cassettes etc.

QUICKSILVA

Music Processor	£14.95
Beeb Art	£14.95
Protector	£7.95
Wizard	£6.95
Mined Out	£6.95
The Generators	£6.95

ACORNSOFT

Hopper	£9.95
PhilosophersQuest	£9.95
SphinxAdventure	£9.95
CastleRiddles	£9.95
Monsters	£9.95
Snapper	£9.95
Planetoid	£9.95
RocketRaid*	£9.95
Meteors	£9.95
Arcadians	£9.95
SuperInvaders	£9.95
MissileBase	£9.95
StarshipCommand	£9.95
Countdown/Doom	£9.95
Snooker	£9.95
NumberBalance	£9.95
WorldSequencing	£9.95
WordHunt	£9.95
MissingSigns	£9.95
Jara	£9.95
Sentence Sequencing	£9.95
LispCassette*	£16.85
ForthCassett	£16.85

BBC SOFTWARE

HomeFinance	£10.00
Painting	£10.00
Drawing	£10.00
GamesofStrategy	£10.00
FunGames	£10.00
NEW	
WhiteKnight	£11.50
Dr. Who Adventure	£10.00
Canyon	£10.00
Toolbox	£21.00

SUPERIOR SOFTWARE

Frogger	£7.95
RoadRunner	£7.95
Pontoon	£6.95
Cribbage	£6.95

NEW - NEW

Hunchback	£7.95
ColditzAdventure	£7.95
Qbert	£7.95
Crazy Painter	£7.95
2002	£7.95
Fairground	£7.95
Star Trek Adventure	£7.95
Lost City	£7.95
Gideon's Gamble	£7.95

Simon Hessel

Great Britain	£5.95
Inheritance	£6.95
The World Travel Game	£6.95

STAR TREK/CANDY

Floss	£6.50
Hangman	£4.50
SuperHangman	£4.50
Atlantis	£7.50
Flags	£4.50
LeapFrog	£7.50
5-a-Side Soccer	£7.50
PontoonandPatience	£7.50

KOSMOS

The French Mistress LevelA	£9.95
The French Mistress LevelB	£9.95
German Master LevelA	£9.95
German Master LevelB	£9.95

SOFTWARE CITY

Call in and see our new shop within a shop (free parking/M62 Exit 7)
Please ring or write for a full catalogue and special discount offers.

DOCTOR SOFT

747FlightSimulator	£8.95
WolfPackIII	£7.95
Kremlin	£6.95
Harmony	£7.95
TablesTeacher	£9.95

R & F SOFTWARE

180	£6.90
Bouncer	£8.00
ShrinkingProfessor	£8.00
HorrorCastle	£8.00
Cyclons	£8.00
Howzat	£8.00
Chuckie Egg	£8.00

VIRGIN

Space Adventure	£7.95
Trench	£7.95
Owzat	£7.95
Chaffin	£7.95
Noc A Bloc	£7.95
Cruncher	£7.95
Microbe	£7.95
Bug Bomb	£7.95
Plank Walk	£7.95

VISION SOFTWARE

Disc Executor	£11.00
---------------	--------

MELBOURNE HOUSE

The Hobbit	£14.95
------------	--------

RHIVA SOFTWARE

Lauching	£14.95
Additional Fun	£14.95
Sets & Operators	£14.95

ROCKWELL SOFTWARE

SpaceInvaders	£7.50
Galaxy Wars	£7.50
CityDefence	£7.50
Synthesizer	£9.50
SeaLord	£7.50
Oblivion	£7.50
GraphicsPackage	£9.50
Old Father Time	£7.50

H&H SOFTWARE

Alphabeta	£14.50
Billiards	£8.50
Shapes&Race	£8.50
Signals&Magic	£5.50
EarlyOne	£5.50
EarlyTwo	£5.50
EarlyThree	£5.50
ExtraOne	£4.50
ExtraTwo	£4.50

DIGITAL FANTASIA

ADVENTURE GAMES FOR THE BBC

TheGoldenBaton	(A/B)
TheTimeMachine	(A/B)
ArrowofDeath(P1)	(A/B)
ArrowofDeath(P2)	(A/B)
EscapellromPulsar?	(B)
Circus	(B)
FeasibilityExperiment	(B)
TheWizardofAkyrz	(B)
Perseus&Andromeda	(B)
TenLittleIndians	(B)

ALL ADVENTURES ARE £9.95

LEVEL 9 COMPUTING

RQForth	£15.00
RQForthToolKit	£10.00
ULTIMATE ADVENTURES	
Snowball	£10.00
AdventureQuest	£10.00
DungeonAdventure	£10.00
Colossal Adventure	£10.00
Lords of Time	£10.00

BEST PRICE IN BRITAIN

TURN YOUR BBC INTO A BUSINESS MACHINE WITH A

TORCH DISC PAC

£820 incl. VAT & FREE delivery

NOW WITH FREE SOFTWARE

PERFECT CALC
PERFECT WRITER
PERFECT FILER
PERFECT SPELLER
TORCHNET
COMANEX SOFTWARE

Valued at over £1,000

LOWEST DELIVERY RATES IN BRITAIN

COMPUTER CITY SERVICE CENTRE

Authorised service centre for Acorn, Apple & Dragon.
Repair, maintenance and extended warranty available for many other computers and peripherals.

BOOKS FOR THE BBC MICROCOMPUTER

Assembly Language Programming for BBC	£8.95	Creating Adventure Progs BBC	£6.95
BBC Expert Guide	£6.95	Easy Programming	
Graphics & Sound	£6.95	The BBC	£5.95
Advance Programming Tech	£7.95	Using Floppy Discs with BBC	£9.95

CREDIT FACILITIES

Ask about instant credit up to £1,000.



MAIL ORDER



Please send me

1.
2.
3.
4.
5.

Postage and packing on software 50p. Phone for hardware delivery rates.

I enclose cheque/P.O. for

OR please debit my Access/Barclaycard/Visa*

* delete as applicable

Card No. Expiry date

Name

Address

Code

Tel No.

Dealers Discount Available

ACCESS, BARCLAYCARD VISA ORDERS WELCOME ON

24HR 051-420 3333

COMPUTER CITY Dept F. FREEPOST (No Stamp Required) 78 Victoria Road, Widnes, Cheshire WA8 7RA.

LARGEST SELECTION OF SOFTWARE IN GREAT BRITAIN
COURTESY OF TIGER DISTRIBUTION.
OVER 700 LINES OF SOFTWARE FOR ALL LEADING MICROS

A SUPERB NEW PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE!

THE MINE

Tunnel through the strata deep beneath the earth's crust in search of buried treasure. Clear the mine of fire breathing dragons and giant man-eating tomatoes with your neutraliser. But watch out for toppling rocks, poisonous toadstools and ruthless phantoms. An exciting and challenging machine code game for only £7.95.



The following top titles are available for both the BBC Micro and Electron:- Killer Gorilla £7.95/ Moonraider £7.95/Bandits at 3 o'Clock £6.95/ Croaker £7.95/Felix in the Factory £7.95/ Felix and the Fruit Monsters £7.95/Chess £7.95/ Escape from Moonbase Alpha £7.95/Draw £9.95/ Swoop £7.95/Intergalactic Trader £8.95/ Positron £6.95/Cybertron Mission £7.95/ Adventure £7.95.

All prices inclusive of V.A.T.
Mail Order: Please add 50p per order P. & P.

WE GUARANTEE THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE.

Showroom: Northwood House North Street LEEDS LS7 2AA Tel: (0532) 458800
Mail Order: 8/8a Regent Street LEEDS LS7 4PE Tel: (0532) 683186 Or: 696343

WRITTEN ANY PROGRAMS? WE PAY 20% ROYALTIES!

SPECIAL OFFER Deduct £1 per cassette when ordering two or more.



WE STOCK THE BBC MICRO, ELECTRON, MEMOTECH MTX 500, COMMODORE 64, ORIC-1 AND SPECTRUM.

B.B.C. MICRO AND ELECTRON PROGRAMS CAN BE OBTAINED FROM SELECTED BRANCHES OF W.H. SMITH, JOHN MENZIES BOOKS, HARRODS, ALL GOOD DEALERS, OR DIRECT FROM MICRO POWER.